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CAR ACTION

THE WORLD'S LEADING R/C CAR MAGAZINE

August 1996

Convert
your
buggy
into a
go-anywhere
do-anything
race
machine

page 78

Rally Racing!



TESTED

KYOSHO
NOSTALGIC MGB

TRINITY
EV10F

TAMIYA
RENAULT ALPINE

SPECIAL
HOW-TO
ISSUE!

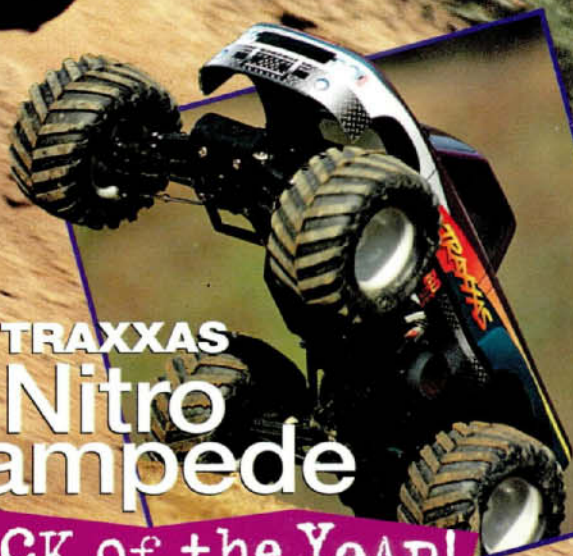
Rematch
Batteries

Understand
Camber

Repair Stock
Motors

Install a
Piston
and
Sleeve

TRAXXAS
Nitro
Stampede
Truck of the Year!



HOP UP
TEAM LOSI'S
Double-XT

USA \$4.95

CANADA \$5.95



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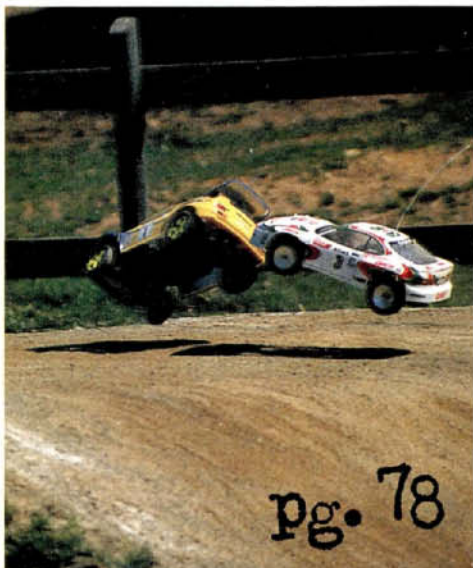
ON THE COVER (clockwise from top): rally cars in action (photo by Walter Sidas); the Traxxas Nitro Stampede is *Car Action's* Truck of the Year (photo by John Howell); learn how to rematch your Ni-Cds (photo by Walter Sidas).

THIS PAGE: (top) rally racers in a midair battle (photo by Walter Sidas); (bottom) the Kyosho MGB Mk. 1 (photo by Mike Ogle).

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EDITORIAL

We didn't really know what we were getting into. Sure, the whole "rally car" idea looked good on paper, but for all we knew, our converted buggies might well have been flops in the performance department. In typical fashion, deadline time was fast approaching as the other editors and I were just finishing up the construction of our rally cars for this issue's main feature. Cars, radios and miscellaneous gear in tow, at the first sign of a sunny day here on the East Coast, we headed to what we hoped would be an ideal site for testing and photographing.

You know that feeling of possible impending doom and carnage that you get when you plop a brand-new, never-before-been-tried R/C car down on the ground for its first run? Well, triple that feeling, and that's how we usually feel because not only do the cars have to look good, but they had better run well, too, or we won't get beans for photos, and then we'll blow our deadline, and then the Ayatollah of Radio Controllah will bellow flames of dissatisfaction (and bits of whatever he ate for lunch) in our direction.

Sometimes, on photo shoots, one curmudgeonly car will decide to cease running, belch smoke (if it's gas-powered but sometimes even when it isn't)

and even shudder into pieces. This doesn't happen often (less seldom with today's high-tech models), but when it does, it throws a monkey wrench of the highest order into our well-laid (well...well-intentioned) plans.

An Editor's High Anxiety!

With a monumental easing of our troubled minds, all three of our rally cars performed far beyond expectations; in fact, it's a good thing that staff photographer Walter Sidas was there to capture the action because I don't think that any of us would have traded our R/C transmitters for a camera that day! What you see when you look at the "Let's Go Rally Racing" feature in this issue is a slice of R/C life—no poses or painstaking photo arrangements; just R/C'ers having a great time.

IN THIS ISSUE...

Elsewhere in this issue, you'll find George Gonzalez's "Truck of the Year" story. This year, we editors unanimously chose the Traxxas Nitro Stampede for its indestructible nature and friendliness to nitro newbies. The fact that I repeatedly jumped one of these trucks 10 feet into the air for more than 30 minutes during the test session for our "Thrash Test" (February '96) didn't hurt during the judging. For our money, there's really no better, more durable, or faster way to get into gas monster trucks at any price (Nitro Stampedes come built).

We also talked contributing author (and off-road expert) Jack Johnson into writing a piece on roll center and camber-link locations. This is a very complicated subject, but it's one that greatly affects the handling of your racecar. Fortunately, Jack was able to distill a great deal of information into a concise, easy-to-understand piece. If you're serious about learning how your car works, don't skip this one!



Frank Masi, Executive Editor



The editors get ready to rally.

We want to hear from you! Write, fax, or e-mail us on the Internet: R/C Car Action, 251 Danbury Rd., Wilton, CT 06897-3035; fax: (203) 762-9803; e-mail:

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Radio Control CAR ACTION

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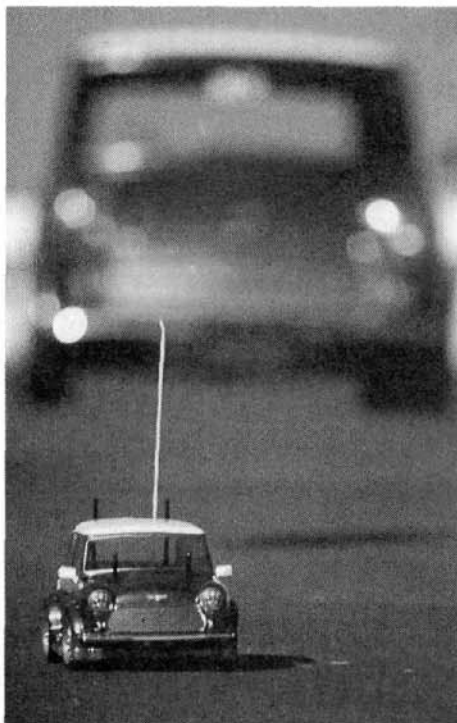
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A Mini Favor To Ask

I've been reading your fine magazine for over three years. I started out as a hard-core, off-road racer but, lately, I've been



caught up in the parking-lot racing scene that continues to boom here in Southern California. I race my Tamiya TA02 ProMarkt Mercedes every weekend along with my M-chassis Mini Cooper. The 4WD sedans used to be more popular than the M-chassis cars but, lately, things have turned around, and there are just as many M-chassis cars as sedans. This brings me to my question: when do you plan to review one of the M-chassis cars? I read

a review on the original Rover Mini Cooper some time ago, but I haven't seen anything since. Did you know that Tamiya has released four more M-chassis cars since the Rover Mini Cooper? How about hop-ups? I noticed that there is a lot of cool stuff for these cars, but I've never seen an article where hop-up parts were used.

I think you should do an article on these cars soon, while the interest is still high. Oh well, keep up the good work, 'cause I plan to keep reading.
DAVID ALTAZARA
Monterey Park, CA

Yes, David, I'm aware that Tamiya has released several new M-chassis cars and that there are plenty of hop-ups for them. Thanks for pointing it out, though! Elsewhere in this issue, you'll find my "Thrash Test" on the Tamiya Alpine A110, which is based on the M02 chassis. And guess what? In the next issue, you'll find my "Mini Wars," which will include four extremely tricked-out minis. Each car is highly modified and very cool. So stay tuned, and thanks for your letter.
George

4WD Dreaming

I've been interested in R/C for about 10 years, and I've been racing seriously for about two years. I am thinking about getting a 4WD off-road buggy, but as you know, the only two companies

that make them are Yokomo and Schumacher, and parts availability isn't good. My question: why don't Associated and Team Losi offer a 4WD off-road buggy? I'm sure they have the resources and technology. If one of these two American-based companies did come out with a 4WD car, it would give them an edge on the competition and bring some popularity to 4WD off-road racing. I hope you can shed some light on this for me. I would appreciate it if you would print this letter. Thank you.

BYRON MCDERMOTT
Escondido, CA

Byron, just for the record, Kyosho, Tamiya and Tenth Technology also make 4WD off-road buggies, but I'm sure you know that already. I'm certain that Associated Electrics and Team Losi have the resources and technology to manufacture an awesome 4WD buggy, but they probably won't—not in the near future anyway. Unfortunately, it all comes down to popularity and, as you know, 4WD off-road racing is not that popular in the U.S.—at least, not popular enough for Associated and Losi to spend hundreds of thousands of dollars on tooling. Who knows? Maybe 4WD racing will become more popular in the future, and we'll see a 4WD car carrying the Losi or Associated badge. One thing is for sure: I'll be the first guy on my block to own one!
George

Lefty's Dilemma

Just over a year ago, I picked up one of your magazines and suddenly became interested in R/C racing. I live in Texas and, in my area, most of the off-road racing is done on

dirt ovals—typical off-road tracks are few and far between. The tracks are mostly hard-packed clay, with 40- to 60-foot straightaways and wide banked turns. Electric-powered rigs dominate and are equally divided between stock and modi-



fied motors. Most of the racers around here continue to hunt for the right chassis, suspension and tire setups, as well as gearing and motor combinations. We would all appreciate it if you would do some articles on dirt-oval how-to's. I'm sure this form of racing doesn't have as great a following as off-road does, but we LTO dirt boys need help, too.
TIM FARELY
Mineral Wells, TX.

Tim, we haven't forgotten about all you lefties out there. In fact, I'm currently working on a "Thrash Test" on the Raborn Racing Originals' Invencer XT dirt-oval truck. Dirt-oval racing was one of the first classes of racing that I became involved in when I lived on the West Coast, and I miss it a lot (there isn't too much interest in dirt-oval racing here on the East Coast). I plan to do a lot of research on dirt-oval setup and will share my experiences, so stay tuned. You can also look forward to a "2nd Look" on the Invencer XT a few issues after the "Thrash Test." The "2nd Look" will be packed with secret oval-racing tips

(continued on page 10)

Errata: in our June '96 issue's "What's New" column, we featured the Pro-Match batteries shown here. We reported that the cells come assembled with high-quality battery bars. They are available both *unassembled* and *assembled* in packs. Please contact Jeff Roe, Pro-Match Competition Batteries, 1850 McCulloch Blvd., Ste. B, Lake Havasu City, AZ 86403; (800) 770-4643 (orders only), or (520) 855-2226, for information, support and service. We are sorry for any inconvenience this may have caused.



In search of fun
and glory, 'cause
life's too short
to be a sheep • by Chris Chianelli

INSIDE SCOOP



Parma Intl. is
Ford flat-beddin'
for '97 with the 1/10-scale

Bigfoot Crusher and the

Parma Off & On



1/10-scale F-150 Super Truck. The super-sleek Super Truck body, which includes a wing and an add-on roll bar, should be very competitive on the high-speed oval this season. The Bigfoot body comes with a Bigfoot decal set, bug deflector, sun visor, roll-bar cowl and molded-in step for true scale excitement.

HITEC LYNX

Here's a look at the Lynx—the newest addition to the Hitec line of car radios. In my humble opinion, Hitec equipment has not yet received the respect it deserves in the car market. I also want to tell you how Hitec has gained tremendous respect in terms of reliability in the R/C airplane world. That isn't easy to do with the airplane crowd. When a radio fails in the airplane world, you end up with a pile of rubble that was once a model airplane costing anywhere from \$400 to \$2,000. More and more of these guys are entrusting the control of their very expensive models to Hitec radios. That's saying a whole lot about their trust in Hitec's reliability. I want you to watch the "Scoop" for other Hitec releases; word has it they have more than one surprise in store for us this year.



Here's
Kwon Jon
Nim (Grand
Master) of
Hitec Chun
Park.



Reedy Z-Series

The Reedy Z-Series motors, Sonic 2, Tri-Sonic, Fire Hawk and the Conquest are all new. They are not updates or modifications of existing Reedy motors. New tooling, parts and materials are combined to create totally new powerplants. The new features of the Z-Series are too numerous to mention here, but I will touch on a few of the more interesting ones. The Vibration Damping Brush System (see diagram) is very innovative. This system absorbs brush vibration, thereby decreasing brush "float" at high rpm and increasing current-flow efficiency. Brush bounce is greatly reduced without having to increase spring tension, and commutator and brush life are increased. Off-road Z-Series motors use large commutators, lay-down brushes and lamination taper bias for increased torque, while the on-road Z-Series motors use small commutators, upright brushes and lamination shape bias for increased rpm. Z-Series stock motors have twin-stack armatures. Even the can is new, and it's 1.4mm thick for a greater magnetic field. If you want to find out more about Reedy's new Z-Series motors, contact Associated Electrics Inc., 3585 Cadillac Ave., Costa Mesa, CA 92626; (714) 850-9342; fax (714) 850-1744.

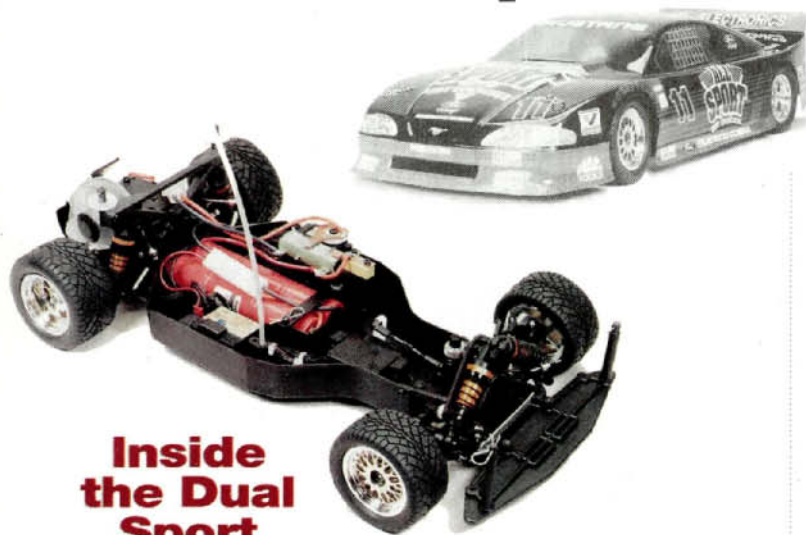


Tozai!

Japan RC Imports now imports the Tozai Comical Racer Series designed for Tamiya's M-chassis (Mini Cooper). Shown here is the Celica GT-Four, which is modeled after a very popular Japanese R/C magazine logo. The GT-Four is formed out of tough polycarbonate, and it comes with clear masking on the exterior to protect against overspray. The body includes a detailed decal set and rear wing. Other Tozai Comical Racers are the Nissan Skyline GTR and Toyota Supra. All three bodies are also available for narrow, 1/10-scale sedans. The chrome and red-anodized wheels shown are Tozai's simulated two-piece wheels. This information is so new that prices are not yet available. Contact Japan RC Imports, P.O. Box 7009-152, Lafayette, CA 94549; (510) 284-5778.



INSIDE scoop



Inside the Dual Sport

For those of you who have seen Associated's ad for the RC10DS (Dual Sport) racer and want to take a look under the hood, here's your chance. As you can see, this is not simply an RC10 with street tires. The DS has new front and rear suspension arms, shocks and shock brackets, front kickup plates, front bulkhead, racing wheels, anti-roll bars and Pro-Line racing tires. For more information, contact Associated Electronics Inc., 3585 Cadillac Ave. Costa Mesa, CA 92626; (714) 850-9342; fax (714) 850-1744.

NEWS BRIEFS

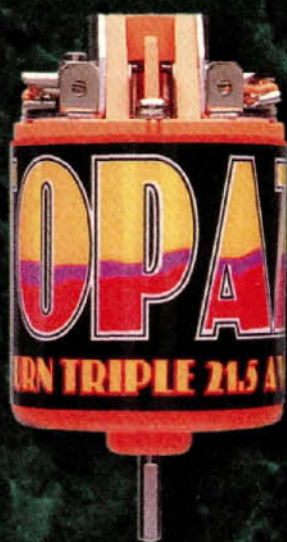


On the left we have Ms. Stock, and on the right, the appropriately named Ms. Modified.

East Coast Challenge

I wanted to show you the trophy girls at the Trinity Off-Road Madness Race at Long Island Raceway in Farmingdale, NY, just to show the world that the West Coast has nothing over us in the East. As a matter of fact, Ernie Provetti—Trinity President and CEO—has thrown down the gauntlet and challenges the West Coast to see who really has the most beautiful girls.

Trinity Presents The SPEED GEMS Collection.



-TOPAZ-

4WD Buggy/1:10 Oval
11 Turns, 3 Winds
36,750 RPM, No. 9200



-RUBY-

2WD Trucks/Buggies
16 Turns, 3 Winds
25,600 RPM, No. 9201



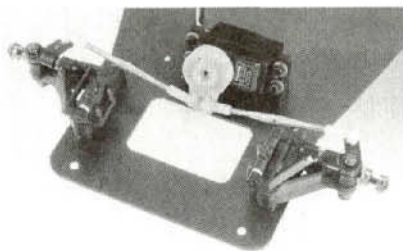
-SAPPHIRE-

Monster Trucks, Planes, Boats
17 Turns, 1 Wind
24,150 RPM, No. 9202



-DIAMOND-

1:10 On-Road/Oval
12 Turns, 2 Winds
33,750 RPM, No. 9203



TRC 100 & 102

TRC's 100 and 102 front suspension kits are direct replacements for any chassis that uses Associated's front end. Made of fiber-filled nylon compound, the front end has enlarged gussets to increase chassis rigidity at the front. TRC still provides holes for the front cross-member. The new suspension has adjustable caster, camber, toe-in and toe-out. The front end also has provisions for adjusting roll center, and the caster self-adjusts, according to suspension compression. The 102 is the same as the 100, except that the 102 includes a Kimbrough servo-saver, aluminum ball joints and cups and aluminum steering turnbuckles. Both are available in black or dyeable white nylon. For more information, contact Total Racing Connection Inc., 210 Charter St., Albemarle, NC 28001; (704) 982-0507; fax (704) 982-0672.

XX CR Racer Refined

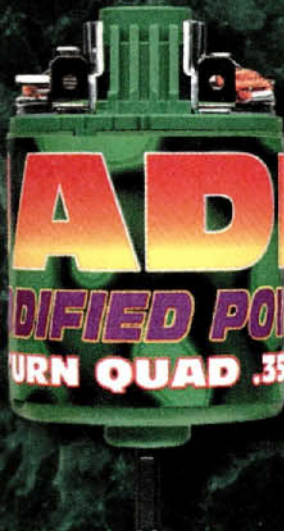
Since Team Losi introduced its Double-X buggy at the '93 IFMAR Off-Road Worlds in Basildon, England, the Team Losi crew with the help of their top racers Brian Kinwald, Greg Hodapp, Jack Johnson and Sohrab Tavokoli have been refining the buggy. What you see before you—the new Team Losi Double-X CR—is the result of all that extensive testing. The CR incorporates the following features that will only further enhance its already stellar performance: a new, sleek, low-profile body; a revised, larger V-wing; five-spoke rigid wheels; Wide Body front tires; Silver compound IFMAR Pin rear tires; 25-degree spindles with revised carriers and new geometry; front arms that accept an optional swaybar; a front bulkhead brace for added rigidity; an adjustable steering bellcrank/servo-saver; a lightweight, rigid, battery hold-down strap; new rear arms with the "factory" shock-mounting position; new, rear, hub carriers with zero-degree toe-in; and a newly designed, rear pivot-plate/pivot-block assembly with 3 degrees of toe-in. Also, all these new parts will fit onto any existing Double-X, so if you have one of the older versions, don't cry, just modify. Stay tuned for a full Thrash Test coming to a theater near you! For more info, contact Team Losi, 13848 Magnolia, Chino, CA 91710; (909) 465-9400; fax (909) 590-1496.



Rare Examples Of Performance And Economy.



-ONYX-
2WD Trucks/Buggies
14 Turns, 2 Winds
29,100 RPM, No.9204



-JADE-
2WD Trucks
15 Turns, 4 Winds
27,060 RPM, No.9206



-QUARTZ-
Touring/F-1, Planes, Boats
19 Turns, 2 Winds
21,540 RPM, No.9207

Speed Gems machine wound modified motors are an excellent alternative for a racer on a budget. Constructed with the same superior quality components as our expensive modified motors, they have a machine wound armature. This combination produces an extremely fast motor at about half the cost of a hand wound. Only \$49.99 list. For a rare combination of performance and economy, acquire a Speed Gem today.

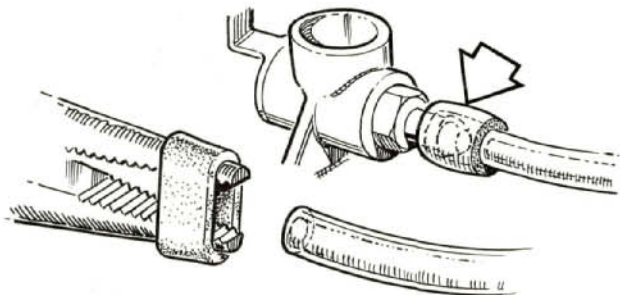
TRINITY

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Facsimile (908) 862-6875



PIT TIPS

by Jim Newman



Tight Fit Lines

To keep your fuel tubing firmly in place, cut a $\frac{1}{2}$ -inch piece (13mm) of it to make a "sleeve." Then stretch this sleeve over the tubing before forcing it onto the carburetor fuel nipple or pressure tap.

TIM WALSH,

Perth, Western Australia

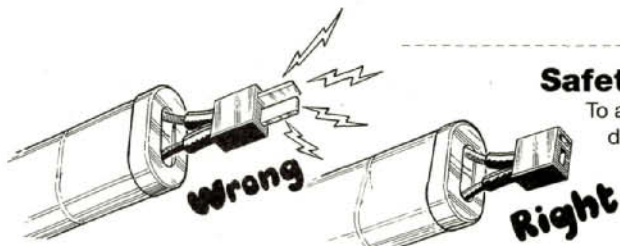


Giant Air Filter

The taller filter is from a GM carburetor (part no. AC GF471). If you have room for one, install it so that it projects into the airstream; it will breathe more easily, last longer and catch cooler outside air. And these cost only a dollar! Foam pre-filters should be stacked in pairs to match the height of the GM filter.

CHAD LINDBERG,

North Branch, MN

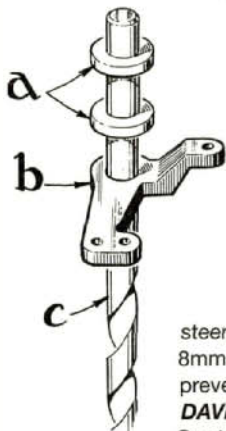


Safety Tip

To avoid short circuits and explosions, install connectors properly: do not leave any live pins exposed. Wire only the socket to the battery packs, as shown here.

JIM NEWMAN,

R/C Car Action



No-Slop Mini Steering

For more precise steering on the Tamiya Mini Cooper, use CA to attach a pair of 8mm

nylon bushings (a) to the top of the steering bellcrank (b); to keep them all aligned, use an 8mm greased drill bit (c). This makes a taller bearing that prevents the bellcrank (d) from rocking sideways.

DAVID ALLINSON,

Santafe de Bogota, Colombia



Captive Parts

To prevent small parts from spilling onto dirt and grass, put them into small Ziploc® bags (or similar), then put the bags into the compartments in your storage box.

DAVID BROWN,

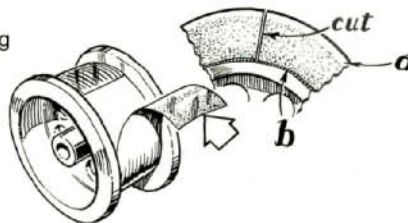
Merrick, NY

Easy-Off Tires

Before gluing a tire to the rim, wrap a layer of plastic packing tape around the rim so that the tire is glued to the tape. To remove the worn-out tire (a), cut down through it, and peel off both the tape (b) and the tire.

DALLAS MILLWARD,

Busselton, Western Australia



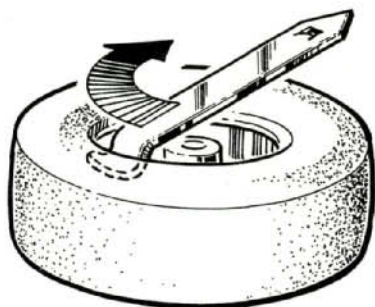
Radio Control Car Action will give a one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Pit Tips." Send a rough sketch to Jim Newman, c/o Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897-3035. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. We're unable to publish many good tips because we don't have the sender's name and address. Please note: because of the number of ideas we receive, we can neither acknowledge every one, nor can we return unused material.



Tire Seating

Use a metal paint-can opener to lift the bead of a newly fitted tire into the wheel rim. Smooth the opener with fine emery paper, and lubricate the bead with liquid dish-washing soap. Then slip the tool under the bead of the tire, and spin it around, as shown. This will lift the bead nicely into the rim.

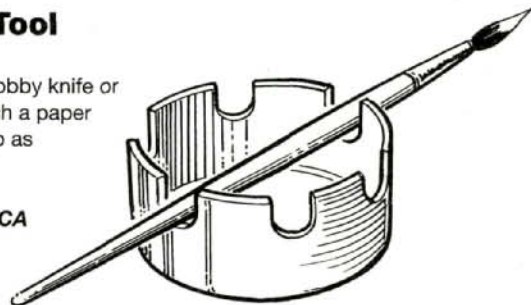
STEVE SHIBUYA,
Jackson, WY



Brush-and-Tool Rest

To easily rest your hobby knife or wet paintbrush, notch a paper cup or spray-can top as shown.

PETER CHUEH,
Hacienda Heights, CA

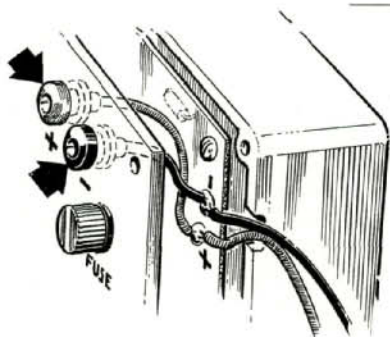
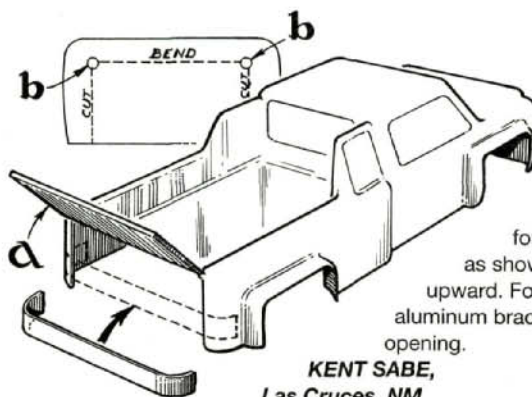


Instant Truck Wing

To give your truck a wing that provides more down-

force, cut its tailgate as shown and bend it upward. For stability, glue an aluminum brace across the opening.

KENT SABE,
Las Cruces, NM



Charger Voltage Jacks

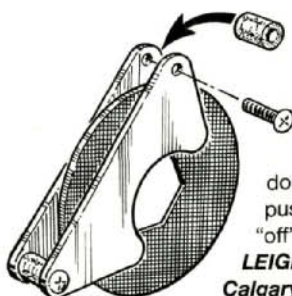
Glue Radio Shack banana jacks (no. 275-725) to the outside of your budget charger's case. Check the space available, then drill the charger's front panel for the jacks, and solder the red and black battery-pack leads to the terminals on the circuit board. Now you'll be able to use an inexpensive Radio Shack digital meter to watch for the tiny voltage drop that indicates that your pack has peaked.

SHANE FIVELLA,
Honolulu, HI

Caliper Push-Offs

If your disk-brake calipers drag after you brake, cut $\frac{3}{8}$ -inch-long (9mm) pieces of rubber fuel line, and install them as shown. These rubber-donut "springs" will then push the calipers to the "off" position.

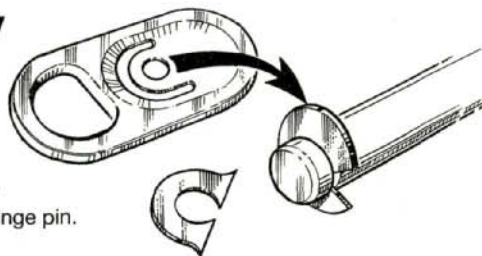
LEIGHTON BURGE,
Calgary, Alberta, Canada



Emergency E-Clip

Snip the tiny piece (shown) from a soft-drink-can pull-tab, and squeeze it into the groove in the hinge pin.

MIKE PICOZZI,
Browns Mills, NJ



WHAT'S new

RPM

Mini Bumper for the RC10B2

This small bumper is molded of tough, black nylon and protrudes 1/2 inch in front of the arms to absorb impacts.

The front edge is curved upward to prevent "dig-ins," and it's

wide enough to completely protect the hinge pins and E-clips. For added strength and durability, the lower side-plate area is twice the thickness of a stock bumper.

Part no.—8051;

price—\$3.95.

RPM, 14978 Sierra Bonita Ln., Chino, CA 91710; (909) 393-0366; fax (909) 393-0465.



DURATRAX

Blast Speed Control

Among the features of this new forward/reverse ESC are solid-state circuitry; thermal-sensing circuitry to prevent heat damage; a unique, removable, black-anodized heat sink; an LED that changes colors when maximum speed is dialed in; plastic mounting lugs; and all factory-installed wiring and connectors.

Part nos.—DTXM1020 (for Futaba J); DTXM1021 (for Airtronics); price—\$89.99 each.

Duratrax; distributed by Great Planes Model Distributors, 2904 Research Rd., Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-0008.



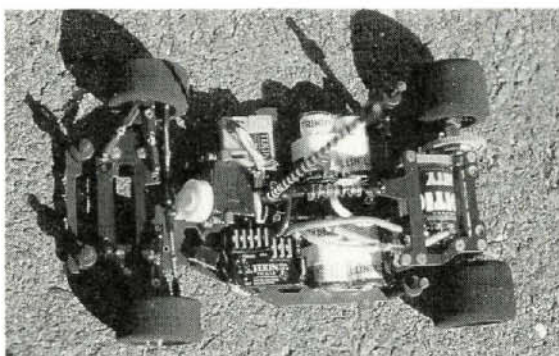
ASSOCIATED

Wing Mounts & Super B2 Wing Wire

These new wing mounts are made of lightweight aircraft-grade aluminum and are available to fit 1/16-inch and 5/64-inch wire. The prebent Super B2 wing wire has a larger diameter (5/64 inch) than the standard B2 wire and will provide a stronger mount for your wing.

Part nos. and prices—no. 6193 (aluminum wing mounts), \$3.50/pair; no. 9455 (prebent Super B2 wing wire), \$2.50.

Associated Electrics Inc., 3585 Cadillac Ave., Costa Mesa, CA 92626; (714) 850-9342; fax (714) 850-1744.



TRINITY

Revolver 22j

This new 1/12-scale car, released to celebrate Joel Johnson's 22nd ROAR national title, features all lightweight-graphite parts, Reactive Caster™ front suspension, a lightweight chassis plate that will accept Trinity's mono-shock front suspension, a lightweight front axle plate, lightweight purple aluminum pod plates, all purple aluminum screws and hardware and lightweight purple rear hubs. It replaces the Revolver 12p (part no. RE0001).

Part no.—RE0012; price—\$299.99.

Trinity Products Inc., 1901 E. Linden Ave. #8, Linden, NJ 07036; (908) 862-1705; fax (908) 862-6875.

TEAM LOSI

Sprint Tires

These new rear tires are perfect for hard-packed surfaces from blue-groove to dusty. They're available in both Silver and Gold compounds; Gold is recommended for both carpet and asphalt tracks. They will fit all popular 2.2-inch and 2.15-inch wheels for both 2WD and 4WD cars. Each pair of tires comes with a free set of foam

inserts.

Part nos.—A-7375G (2.2-inch rear—Gold); A-7375S (2.2-inch rear—Silver); price—\$12/pair.

Team Losi, 13848 Magnolia Ave., Chino, CA 91710; (909) 465-9400; fax (909) 590-1496.



TAMIYA

Fiat Abarth

This 1/10-scale car is based on the RWD M02 chassis and is equipped with M-chassis Super Slick rear tires, normal-tread front tires, a tough, polycarbonate body, a complete decal set, a 540 motor and a three-step mechanical speed control.

Part no.—58158; price—\$234.

Tamiya America, 2 Orion, Aliso Viejo, CA 92656-4200; (800) TAMIYA-A.



PARMA/PSE

Audi A-4 Body

This new 1/10-scale body is made of 0.040-inch-thick clear Lexan and will fit the Tamiya, Yokomo, Kyosho and HPI narrow touring cars' chassis. The front wheel wells provide good tire clearance and suspension travel without sacrificing scale appearance or airflow. The body includes a free rear wing.

Part no.—10361; price—\$21.

Parma/PSE, 13927 Progress Pky., North Royalton, OH 44133; (216) 237-8650; fax (216) 237-6333.

NOVAK

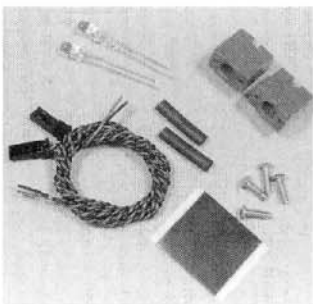
Brake-Light LED Accessory Kit

This brake-light kit will add scale realism to your vehicles. The kit includes two bright LEDs, mounting brackets, screws, heat-shrink tubing, mounting tape, a decal sheet and instructions. Use this accessory with any speed control equipped with brake-light circuitry.

Part no.—5655;

price—\$12.

Novak Electronics Inc.,
18910 Teller Ave., Irvine,
CA 92715; (714) 833-
8873; fax (714) 833-1631.



DYNAMITE

TNT .12R Engine

This new engine has enhanced idle, low-speed tuning, great midrange performance and longer-lasting components, so it's more reliable. The design features Dynamite's Super Rod conrod, front Super Seal bearing and O-ring-sealed, low-speed needle; it offers greater acceleration, higher rpm and reduced stress.

Part nos. and prices—DYN6150 (with pull-start for universal/GTX), \$139.95; DYN6151 (with pull-start for RC10GT), \$139.95; DYN6155 (non-pull-start for universal/GTX), \$129.95; DYN6156 (non-pull-start for RC10GT), \$129.95.

Dynamite; distributed by Horizon Hobby Distributors, 4105 Fieldstone Rd., Champaign, IL 61821; (217) 355-9511; fax (217) 352-0355.



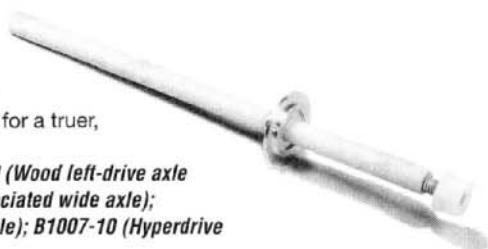
BSR RACING

Axles

These lightweight fiberglass axles have higher tensile strength and fracture-resistance than most currently available axles. The diff collars are made of strong aircraft aluminum. Centerless grinding makes for a truer, more balanced axle.

Part nos.—B1000-10 (Associated narrow axle); B1001-10 (Wood left-drive axle 0.700); B1002-10 (Trinity left-drive axle); B1003-10 (Associated wide axle); B1004-10 (Bolink narrow axle); B1005-10 (Bolink wide axle); B1007-10 (Hyperdrive wide axle); price—\$21.50 each.

BSR Racing, Rte. 6, Box 54, Killen, AL 35645; phone and fax (205) 757-1564.



SPEEDZONE

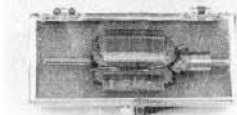
Armature Holder

Made to protect any armature, this acrylic case features a clear top and a sponge insert for cushioning.

Part no.—S21200;

price—\$6/pack of 4.

Speedzone, 1750 Broadway, New Hyde Park, NY 11040; (516) 354-8178; fax (516) 354-0692.



PROTOFORM

1997 Grand Prix SS Body

This new, ultra-sleek 1/10-scale body is molded from crystal-clear GE Lexan in both lightweight 0.030-inch thick and regular weight 0.040-inch thick and will fit all popular superspeedway chassis.

Part nos.—1214L (0.030); 1214R (0.040); price—\$19.95 each.

Protoform, P.O. Box 456, Beaumont, CA 92223; (909) 849-9781; fax (909) 849-2968.

Descriptions of the products shown here were taken from manufacturer and/or advertising agency press releases. The information given does not constitute an endorsement by Radio Control Car Action or guarantee product performance or safety. When contacting a manufacturer about any product described here, be sure to say you read about it in Radio Control Car Action. Manufacturers! To have your products mentioned here, send press releases to R/C Car Action, What's New, 251 Danbury Rd., Wilton, CT 06897-3035.



Novak Explorer

ONCE AGAIN, Novak* has come up with a totally new electronic speed control (ESC)—a sport model—that will make our R/C cars explode with performance. The reasonably priced, forward-only (with braking) Explorer has many features that set it above most comparably priced sport controllers, and it's therefore suitable for first-time buyers and backyard burners.

To appreciate the Explorer's features, check out the "What it Has" sidebar. Making it unique is its built-in brake-light circuit. If you buy Novak's brake-light accessory kit (part no. 5655) you can have functional brake lights. The accessory kit contains two high-powered light-emitting diodes (LEDs), wire and mounting hardware. When you are in neutral or apply the brakes, the brake lights will shine brightly—a great idea for Formula 1 cars and street racers.

INSTALLATION

The four major considerations when installing an ESC are:

- knowing what plugs in where;
- selecting the best mounting position;
- avoiding radio interference;
- adjusting the transmitter and ESC.

Novak's instruction sheet covered these topics in great detail, but I thought the photos were a little small (time for new glasses?).

I don't recommend

that you do so, but I can't resist the urge to look inside a new ESC, and this one was a little tricky. The flat bottom is free of screws—an ideal surface for mounting tape. As always, Novak's design and workmanship are top-quality. The printed-circuit board is computer-grade epoxy/glass, all the miniature components are surface-mounted, and the solder joints are flawless.

If you make a mistake when wiring an ESC into your vehicle, you might destroy it, and you will certainly have voided the warranty; but the Explorer's wires are color-coded, so you're unlikely to mix them up.

TEST 1—RESISTANCE

With 12 amps of current flowing, I measure the voltage drop across the ESC and then calculate its "on" resistance by dividing the measured voltage drop by 12. I measure resistance twice—along the full length of the motor wires and battery wires (including connectors) and 2 inches along them. The first reading helps me to determine an ESC's resistance as it comes from the factory, and the second gives a standard reading that I use to compare ESCs. Low resistance is very desirable.

- **Voltage drop along the full length of the battery wires and motor wires:** 0.27 volt—a resistance of 0.0225 ohm.

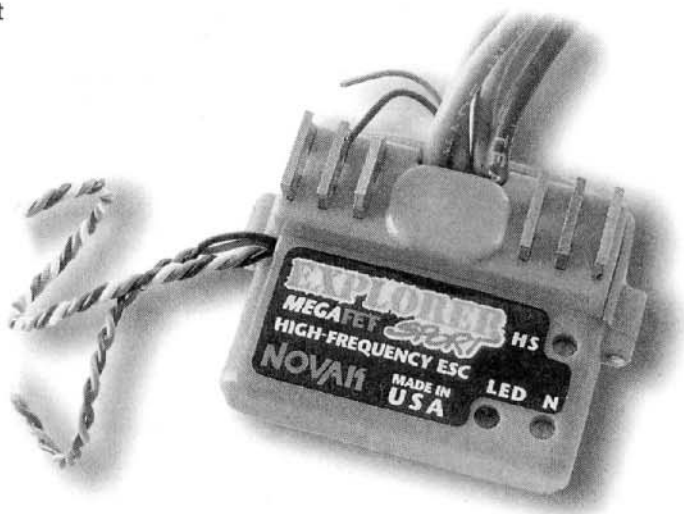
- **Voltage drop 2 inches along the battery wires and motor wires:** 0.11 volt—a resistance of 0.009 ohm. Novak claims a resistance 0.005 ohm, but ESC manufacturers just list the resistance of the FETs, and we know that the wires, circuit board and solder joints account for a hefty chunk of an ESC's voltage drop.

Note that the first reading is 2.5 times the second reading, so low-resistance connectors and short wires are obviously very important. For racing, I'd use Deans* Ultra Plugs or Litespeed* Super-Con connectors or, if you're really serious, you should hard-wire (solder) your connections.

TEST 2—OVERHEATING

I "cook" every controller I test by adjusting the resistor bank to pass 20 amps of current, jamming the throttle wide open and running the ESC for 15 minutes while it pumps a hefty 20 amps.

My tests showed that if you use the provided heat sink and install the Explorer so that it gets plenty of cooling air, it will handle a stock motor with ease and will



handle most mild modified motors, too.

TEST 3—SHORTING OUT

Next, I dropped a dead short across the motor leads and put the pedal to the metal. My current-monitor resistor indicated that the Explorer was handling 40 amps, and things got hot in a hurry. I continued this for 60 seconds, then I removed the short and found that the

WHAT IT HAS

- Novak's Polar Drive Technology™ (for cool running and increased radio range).
- Built-in brake-light circuit.
- High-frequency motor control (smooth throttle response, especially at the mid to low throttle range).
- Solid-state reverse-voltage protection (RVP).
- Five MEGAFETs (three for forward; one for braking; one for RVP).
- Built in Schottky diode (improves efficiency and reduces radio interference).
- Electronic thermal-overload protection.
- Two adjustment potentiometers (neutral and full speed).
- A built-in pulse-checking LED to ensure accurate setup.
- Factory-installed connectors (make installation a breeze).
- Complete accessory package, including decals, motor capacitors, motor wires with bullet connectors, mounting tape, adjustment screwdriver and instruction sheet.



Explorer was operating normally.

A burnt-out motor, jammed gears, or getting stuck under the edge of the fence all make the current flow go ballistic. If your car won't go, it's time to stop and see what the problem is before you melt some valuable components.

EXPLORER EXPRESS!

The Explorer passed all my tests and was still in good working order, so it was time to have some real fun—backyard bashing in my MRC MT-10S truck. The instructions recommend that you mount the ESC as far from the receiver as possible. I mounted the Explorer on a platform that's bolted to the rear shock tower, and I

installed the battery pack with its power leads toward the rear of the car. All the motor/battery wiring is in the rear of the car, and the receiver and its antenna are near the middle. To round out my glitch-proofing, I installed

Usually, when an ESC is labeled “sport,” my only expectation is a low price, so I was pleasantly surprised.

three 0.1-microfarad capacitors across the motor.

When I go out to play with my truck, I like to go fast, so I have a Trinity Kinwald modified motor grafted to its transmission. I've adjusted the

gearing to provide about a 4-minute run. What really determines the current an ESC will be subjected to is the gearing, not the motor. Modified motors turn ballistic rpm, and if you use the same gearing as you used with a stock

every run.

One of the biggest surprises was how cool the Explorer was at the end of the runs; the resistance numbers I obtained in the lab were average for a sport ESC, and I had expected some heating in my truck. The Polar Drive Circuit™, which allows modified motors to be used in a sport application without overheating, really does its job well. The large purple heat sinks and supply of cooling air also help do the trick.

CONCLUSIONS

The Explorer is Novak's latest offering for the sport ESC market. Usually, when an ESC is labeled “sport,” my only expectation is a low price, so I was pleasantly surprised. The Explorer's resistance was middle-of-the-range for an ESC of this type, but it ran cool—because of the Polar Drive Circuit™ and the large heat sinks.

The best part was the Explorer's silky smooth feel. The Polar Drive Circuit™ coupled with high-frequency technology, gives the Novak controllers their unique smoothness.

This controller may not be the choice of top professional drivers, but it should be able to hold its own in a stock-class race—especially if you use high-quality connectors or hard-wire the connections.

But perhaps the Explorer's neatest feature is the brake-light drive circuit. I haven't tried this feature yet, but I have a '40 Ford coupe street rod just waiting for a pair of taillights....

motor, your mod motor may well deliver disappointing performances. So be prepared to install a much smaller pinion than you used with your stock motor. If you don't, you'll probably smoke your high-dollar modified.

With the Explorer installed and several 6-cell battery packs charged, I headed to the parking lot. I installed the first battery and turned the MRC MT-10S loose. From the very first throttle squeeze, this combination was a hot performer. When I stood on the throttle, acceleration was great, and top speeds were blinding. But most impressive was the total control that the Explorer allowed. When testing the Explorer in the lab, I had noticed that the throttle action was very linear and very smooth, and I saw the same smoothness on the road test.

I ran through several packs—high-speed running, hard braking into sliding turns, and slow to moderate speeds for tight corners. Even at close to a full battery dump, I had steering and motor control, so the car came home at the end of

SPECIFICATIONS

DIMENSIONS

Height (no heat sinks).....	0.8 in.
Width.....	1.43 in.
Length.....	2.0 oz.
Weight w/heat sink.....	2.1 oz.

TUNING

Access to controls.....	Excellent
Ease of adjustment.....	Good

LIST PRICE/WARRANTY.....	\$99/90 days
--------------------------	--------------

ELECTRICAL (Manufacturer's specs)

Voltage (max./min.).....	7/6 cells
Max. current.....	Not given
Continuous current.....	150 amps
Resistance.....	0.005 ohm

TEST PARAMETERS

Voltage.....	6 volts
Current.....	12 amps
Voltage drop	
—along full length of wires.....	0.27 volt
—2 inches along wires.....	0.11 volt
Calculated resistance*	
—along full length of wires.....	0.0225 ohm
—2 inches along the wires.....	0.009 ohm
BEC output, 6-cell battery.....	4.99 volts

*Resistance = Voltage drop ÷ Current

COMMENTS: this digital, economically priced, sport ESC has a silky smooth feel, middle-of-the-range resistance and a unique brake-light circuit.

*Addresses are listed alphabetically in the Index of Manufacturers on page 166. ■



TRUBLE SHOOTING

by George M. Gonzalez

Wobbly SRT

I own a Traxxas SRT. It's a great truck, but the rear tires wobble when it runs at slow to medium speeds. I've also noticed that the rear wheels have about $\frac{1}{8}$ inch of play between the wheel hub and the axle bearing. The tires are mounted correctly, so I'm sure they aren't the problem. I've raced it in stock and modified classes, so it has some mileage on it. The fastest motor I've used is a Trinity Dirtinator 13-turn, and

I'm using a 16-tooth pinion and an 84-tooth spur gear. What went wrong?

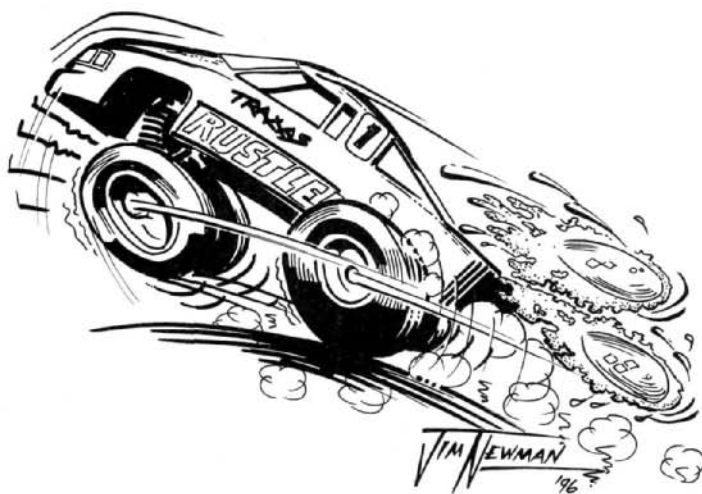
DANIEL ARTMAN
Bothell, WA



Daniel, $\frac{1}{8}$ inch of play between the wheel hub and the axle bearing is pretty severe. To get rid of the slop, place an axle washer on the inside of the rear axle behind the bearing, and place one on the outside behind the drive pin. Also, your truck's rear axles might be slightly bent, and that would definitely make the wheels wobble. Off-road racing is brutal on a racing truck's drive-line parts, and

If you have a technical problem that your hobby shop or racing friends can't resolve, give us a shout at Radio Control Car Action, and we'll see if we can chase down an answer for you. Questions should be of a technical nature and should be addressed to Troubleshooting, Radio Control Car Action, 251 Danbury Road, Wilton CT 06897-3035. We regret that, owing to the tremendous number of letters we receive, we can't respond to every one.

rear axles should be considered replaceable items. Check to see whether they're true (not bent) by rolling them on a flat surface; they should roll smoothly and always stop in a different location. If they're bent, replace them. Good luck.



Stop Yoking Around

I'm having trouble with my Traxxas Rustler. When I hit the throttle, the output yokes slip. I've tightened the setscrews, but the yokes still slip. Can you please help?
BRIAN KANASKIE
York, PA

Brian, there's a possibility that you stripped the threads on the molded drive yokes; tightening the grub screws excessively could cause this. Go to your local hobby

store and pick up another set of yokes, which will only set you back a few dollars. When you install the new ones, be sure the grub screws make contact with the flat spots on the drive shafts (not the round part of the drive shafts), and tighten them down until you feel a slight resistance. Tightening them further will only strip the yokes again, so be careful.

Charging Duds

I have a 4-cell Ni-Cd battery pack, and I'm trying to charge it on my new Tekin BC 110L peak charger. The problem is that when I try to fast-charge it, the charger shuts down in 1 or 2 minutes. I checked all my connections (solder joints), and they're fine. The total voltage of the pack is 3.13 volts. The breakdown of each cell's voltage is:

1. 0.23 volt
2. 1.13 volt
3. 1.13 volt
4. 0.64 volt

The pack is kind of old, so that might be the problem.

Also, can the Tekin charger charge a 4-cell pack? The instructions don't include specs. Your help would be appreciated.

MARK GOODS
goodss@vaxrb.niehss.nih.gov

Mark, the Tekin BC 110L is a good DC charger. It is designed to charge four to eight cells at zero to 10 amps, so it shouldn't have any problem charging your pack unless some of the cells are bad. According to the figures, you might have a couple of dead cells. Discharge the pack completely, and then charge it at a lower rate (around 2.5 amps). It may take longer to charge, but it should do the job. I honestly think that your battery pack is the problem—not the charger.





TROUBLE SHOOTING

Wimpy Touring Sedan

I just bought a Tamiya sedan that has a TA02 chassis. I don't know why, but it seems slow; I thought it would be faster. The instructions don't specify how hard you should tighten the ball diff. Will having it too loose affect its speed? The car starts off quickly, but its top speed is a little wimpy. I'm using the stock speed control and motor; could that be my problem? Will a Trinity Green Machine 2 or a Midnight stock motor improve the speed? Thanks for your help.

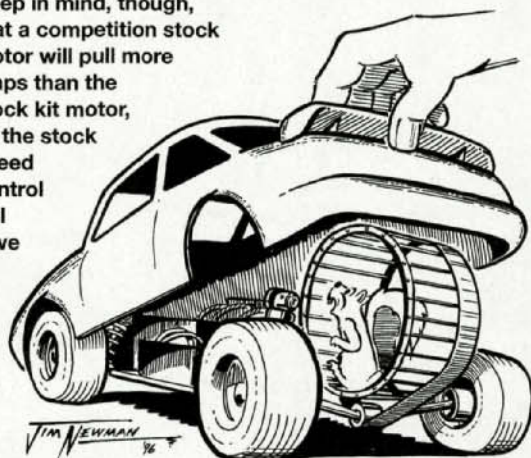
JUSTIN KANTOR
kantorbgs.com

Justin, the Tamiya ball diff is a high-quality unit, but it isn't really adjustable. Tighten the diff all the way. If you run the diff loose, you will risk damaging it. The stock 540 motor that comes with the TA02 is a little on the wimpy side, but it's good for developing your driving skills. The 21-tooth pinion gear that comes with the kit provides the highest possible gearing. This means that the top speed can't be any faster.

Installing a smaller pinion gear will increase off-the-line-punch, but limit the top speed even more. If you do pick up a

competition stock motor, such as the Trinity Green Machine 2 or a Midnight, you will definitely notice an increase in top speed. Keep in mind, though, that a competition stock motor will pull more amps than the stock kit motor, so the stock speed control will have

to work double-time. You might also consider picking up an inexpensive electronic speed control, if your budget allows.



Gentlemen start

POWER START

COMPACT STARTERBOX FOR RC CARS

- Special fixtures for Associated® and Losi® gas trucks
- Compact, powder-coated aluminum case (12"x 4.5"x 3")
- Low noise twin Kevlar timing-belt transmission
- Ballraced 3-piece starter wheel
- Dual 540-size electric motors
- Powered by two 7.2 V battery-packs (not included) *will give you well over a day of easy starting without charging!*
- Electronic glow plug driver optional



INTERNET
www.serpent.nl

CONTACT
your dealer or:

Pushy GT

This past summer, I acquired an RC10GT. It's been great, except for a few problems. Every time the truck enters corners, it has almost no steering. I've tried the obvious—slowing down—but that didn't help. I've also tried new springs and drilling holes in the tires. Another problem is that my truck won't idle, even when the idle is turned all the way up. I've completely rebuilt the carburetor and put in new seals.

I've also noticed lately that my truck has lost compression and that the bearing is letting fuel out. What can I do to fix this? Your advice would be appreciated.

JAMIE DIXON
Ontario, Canada

Jamie, you forgot to tell me one thing: what kind

of steering servo do you use? A standard servo, e.g., a Futaba S148, Airtronics 94102, or something similar, is OK for 1/10-scale electric trucks, but it simply won't do the job on a 1/10-scale gas truck. To turn a gas truck's wheels with authority when it enters corners, you need a servo that puts out at least 50 ounces of torque or more.

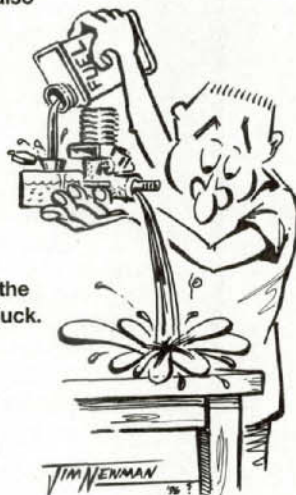
I also assume you installed softer springs, because it sounds as if you have a good grasp of R/C setup. Softer springs up front and additional holes in your tires provide a little more steering, assuming that you run the tires without the foam inserts, but apparently none of these changes corrected your problem.

I recommend that you try different tire combina-

tions (check out Jack Johnson's "How To Select the Right Off-Road Tire" article in the June '96 issue of *R/C Car Action*). You might also add more braking to your driving style. If your truck isn't set up with coast-brake, then you'll have to hit the brakes to turn. If you don't have a high-torque throttle/brake servo in your truck, I highly recommend that you pick one up.

You mentioned that you have engine problems, but you didn't say which engine you use. If your engine feels as if it's losing compression, doesn't idle correctly and leaks fuel through the crankshaft bearing, you might have serious problems on your hands. To bring your engine back to life, install a new

piston and sleeve. You might also check out Dynamite's Super Seal crankshaft bearing. It features dual rubber seals, so dirt and air won't enter the engine through the bearing. These bearings will also prevent fuel from leaking out. At this point, you should also replace all your fuel line; don't forget to use a fuel filter, and never run your truck without the air filter attached to the carb. Good luck.



your engines...

STOP pulling...
POWERSTART your gastruck...

Serpent® **PERFORMANCE THROUGH QUALITY**

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WEST PARK CENTRE
2832 NW 79th AVENUE
MIAMI, FLORIDA 33122

Phone: (305) 639-9665 Fax: (305) 639-9658
INTERNET: <http://www.serpent.nl>
E-mail: serp-usa@ix.netcom.com



10 steps that will keep your stock motor screamin'

YOU'VE BEEN there; I've been there; we've all been there: entering the first infield turn after blasting down the main straight, you overshoot the turn and whap your truck or buggy into the outside wall at top speed. Suddenly, everything starts to slow down, and within a lap or two, you're dead at the side of the track. First, the marshal just stares at your vehicle, figuring that you're making radio adjustments. Then he picks it up, takes a quick look inside and announces for all the world to hear,

"Your endbell has popped off the motor," followed by one of those cut-the-throat signs that means you're finished. Great, just great. Thirty bucks for a tuned stocker, and it's gone—right?—maybe, maybe not.

I've lunched my fair share of so-called sealed endbell stock motors. I used to just toss them away, figuring that they were toast whenever the endbell came off. Of course, before the yen and the dollar did their weird international currency-exchange dance, you used to be able to buy a pretty

decent stock motor for \$15 to \$18. My wallet was hit a lot harder, however, when stock motors went up to \$40. At the same time, for some reason, endbells don't seem to be held on as well as they used to. Have you noticed that? Take a close look at the stock motor in your current ride, and try to wiggle the endbell back and forth. Isn't it just a little loose?

So, the first rule of stock-motor ownership should probably be to tap down the endbell tabs more firmly, using a center punch (a tool that resembles a thick nail) or a small screwdriver and a garden-variety hammer. That way, you'll have to really wallop the boards before anything unfortunate happens to your motor. Do this on a solid surface, and

be careful not to slip and whack your hand or drive the screwdriver into your finger (ouch!). This is one of those activities probably best done with a close friend: one person holds the motor; the other holds the punch and the hammer.

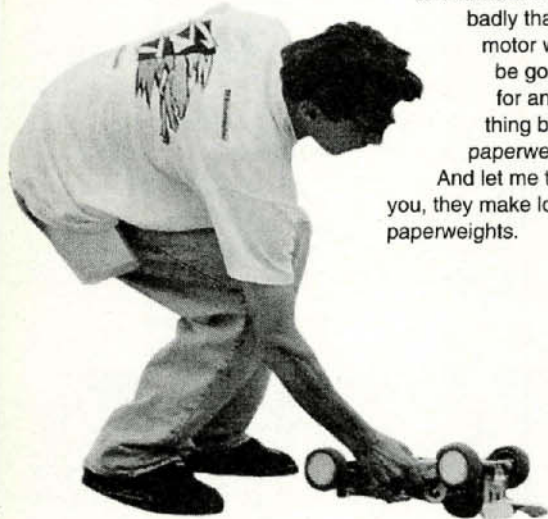
If it's too late, and you've already done the "whack-o-rama," follow these easy steps to reclaim your motor from the dumpster. In the course of writing this article, I've actually rescued more than a dozen motors this way (no, I didn't ruin them all!). Take your time, perform each step properly, and you should be able to re-use virtually every motor that you thought you had destroyed.

Stop Driving!

1 Don't continue to drive if you think there's something wrong with your car. For years, *Car Action's* electronics expert John Rist has advised that you pull over if your car slows down dramatically. He's usually referring to speed controls that may be overheating, but it also holds true here. If you don't force the motor to turn after the endbell has popped off, you stand a better chance of reclamation. Don't use a heavy trigger finger after the damage has been done; if you do, you'll scar the bushings

and armature so badly that the motor won't be good for anything but a paperweight.

And let me tell you, they make lousy paperweights.



Yank It!

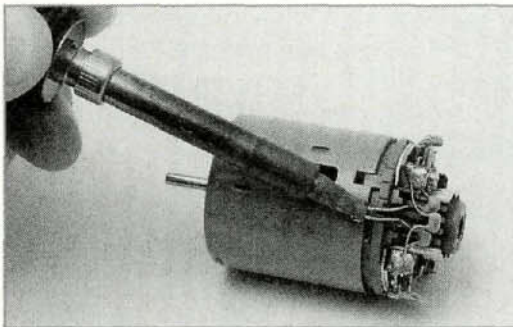
2 Yank the motor out of your truck or buggy, and let it cool before you work on it. Many times, motors in this condition will be very, very hot, and you'll either burn yourself or drop the motor, which causes more harm. Put it aside, install another motor if you can, and wait until you get home to try to fix it.



Unsolder

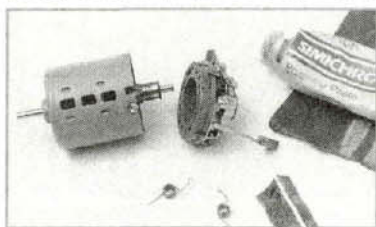
3 When you're at your workbench, unsolder the capacitor wires that are soldered to the can. If the caps are damaged, throw them away, and replace them with a new set when you're finished. Remove the brush springs, and pull

the brushes from the hoods. Check the surface of the brushes for scrapes, nicks and gouges. If you're really lucky, they can be re-used, especially if they're not blued at the ends from excessive heat.



Endbell Inspection

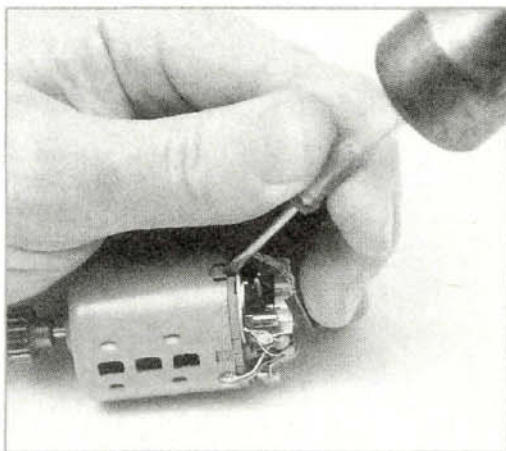
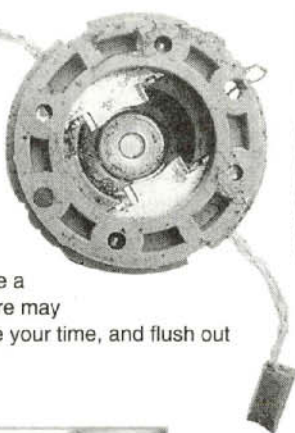
4 Pull the endbell the rest of the way off, but don't use too much leverage on the endbell hardware. Don't bend anything, and try not to pull too hard. You may have to jiggle things along until the endbell comes off. If you're very careful, you can remove the entire assembly without scarring the upper bushing on which the motor shaft rides. Do not remove the armature from the motor can! While you may be able to sleep at night if you've done this, knowing that the armature wasn't actually replaced, it's really not legal under most racing rules to pull the arm and then put it back in. Once the endbell has been completely removed, make sure to put all the thin washers back on the end of the



motor shaft. They frequently stick to the bottom side of the motor bushing. Check the end of the shaft for nicks or divots; it's almost impossible to bend this end of the motor shaft, so don't worry too much about that. If the shaft is scratched, polish it with no. 600 wet/dry sandpaper, followed by some Simichrome or Brasso metal polish.

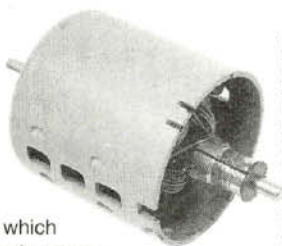
Clean It Up

6 Without driving metal shavings farther down into the motor can, clean the inside of the endbell and the upper end of the armature with motor spray. When these motors pop open, they normally cause some trauma to the brushes and spread brush dust all over the inside of the can. If you use a high-graphite brush compound, there may be fine black dust everywhere. Take your time, and flush out everything well.



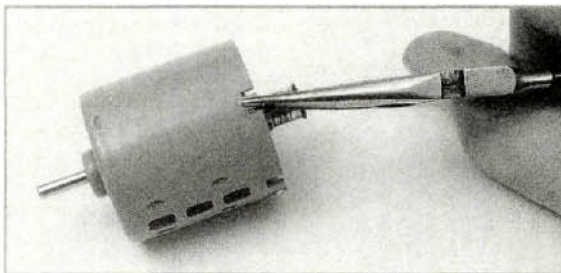
Replacing the Endbell

8 Replace the endbell, and carefully slide the locking tabs into the proper slots in the can. Before you re-seal the endbell, spin the motor shaft a few times to make sure there's no binding between the bushings and the motor shaft (a short piece of rubber fuel tubing makes a dandy handle; so does a pinion gear). Have a friend hold the reassembled motor while you carefully tap the tabs back down on the can so that the endbell is once again firmly attached. Truly paranoid types will also epoxy the tabs down.



Straighten Up

5 Using needle-nose pliers, straighten the can's endbell tabs so that you'll be able to replace the endbell easily without forcing the parts back into place. Check the commutator surface for scrapes, scars, or dents. Once again, if the comm looks pretty good, you have a better chance of saving the motor.



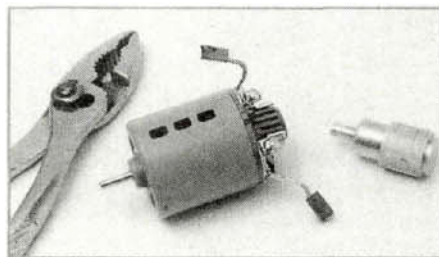
Re-Cut the Comm

7 You'll probably have to re-cut the commutator to remove any scratches or scrapes from the comm surface. A good stock motor comm lathe with a diamond bit will take care of this. If you don't own a comm lathe, most hobby shops and race tracks offer this service, or someone can be recommended who will do it for you. I re-arc'd the brushes using a waffle brush cutter in an old modified motor can. They'll re-seat to the newly cut comm surface in just a few minutes.



Spin that Shaft

9 If the motor shaft doesn't spin freely, tap each end a few times with a light hammer or the flat side of a slip-joint pliers (they're just the right weight) to re-seat the bushings. Use the center punch or a small screwdriver on the short shaft end in the endbell. Bushing slop can be removed with a bushing whacker like the one in the picture or a short length of brass or copper tubing with an inside diameter of 1/8 inch.

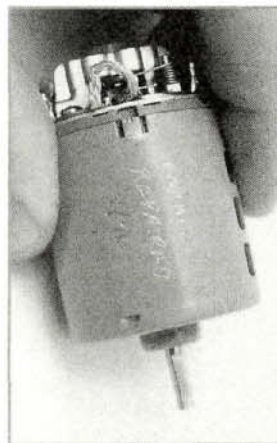


Dyno-Mite!

10 Voilà! This was a race motor that I had dyno-tested the night before it got popped. After repairing the motor as described, I dyno'd it again, and found that the power and rpm numbers were within 1 percent of the original readings! Not too shabby, considering that many racers would have tossed it into the trash can!

Remember: removing the endbell is considered illegal by every national racing organization; cutting the commutator is also banned by some organizations. Mark any motor that has been through this repair process with an engraving tool so that you don't use it in sanctioned competition.

** Addresses are listed alphabetically in the Index of Manufacturers on page 166.*





GETTING STARTED

by Brian Leslie

Tools of the Trade

WHEN spending money on their hobby—R/C, of course—many people overlook the importance

of having the right tools. To assemble R/C kits, you don't need every tool Sears ever stocked, but you do have to stop

using that butter knife as a screwdriver!

Many kits include tools such as Allen wrenches or ones that are

pertinent to that particular kit, but you will need to supply a few additional tools to complete the building process.

THE NECESSITIES

Every R/C builder should keep on hand the basic tools shown here. There is hardly a kit on the market that can't be built with these simple tools.

Wire cutters

Use them to cut the parts off a parts tree, and then use the X-Acto® knife to trim them. When it's time to hook up your motor and electronics, you'll need wire cutters. You'll have to cut heavy-gauge wire (12 to 16AWG) and then strip the ends of the leads so that you can solder the wire strands to the motor, etc.

Lexan scissors

It's almost impossible to trim a Lexan body with a regular pair of scissors. The curved end on a Lexan scissors cuts perfectly round wheel wells and smooth corners on the body.

Needle-nose pliers

These are perfect for installing E-clips and are very handy for holding nuts or other parts in places where your fingers won't fit. You can also use them for pressing together parts that may be too difficult to keep together by hand, e.g., the drive pin in the rear axle on off-road cars and trucks.

X-Acto® knife

—one of the most frequently used tools, and it's worth its weight in gold. Every kit has nylon or plastic parts on "trees." Use the X-Acto® to cut the parts away from the trees and to trim off the flashing.

Four-in-one screwdriver

Kits may use slotted-head screws, or Phillips-head screws—or a combination of the two. It has flat blades in two sizes (for slotted screws) and two sizes to suit Phillips-head screws. One of the four sizes will almost always get the job done.

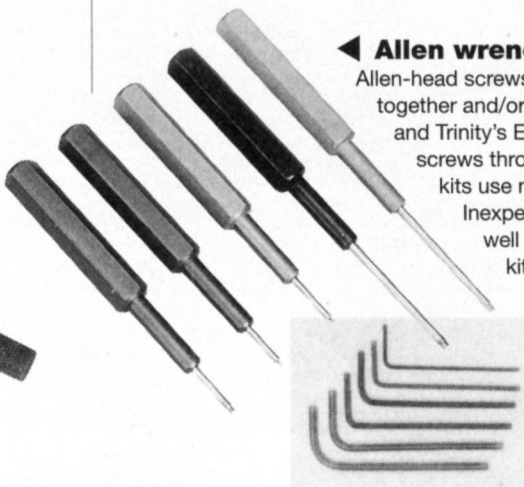
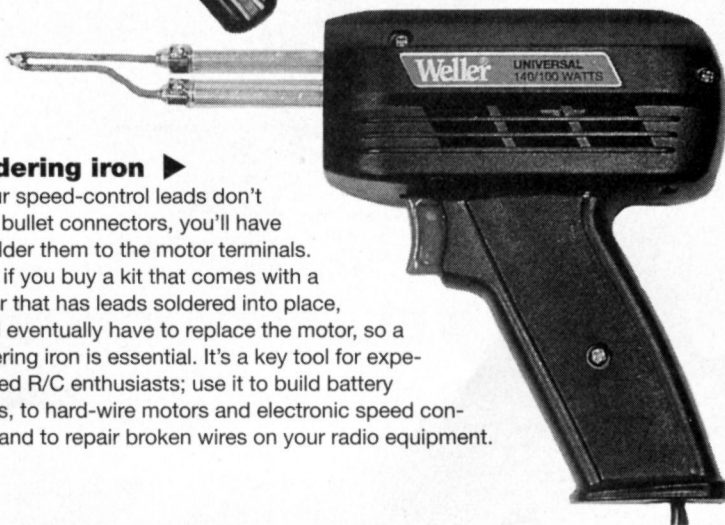
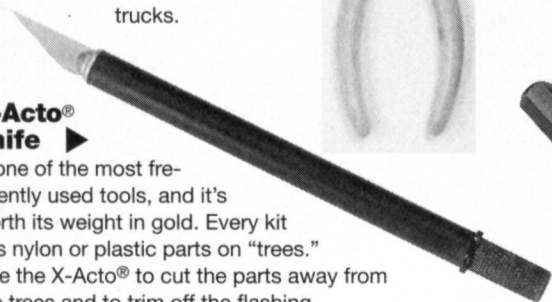
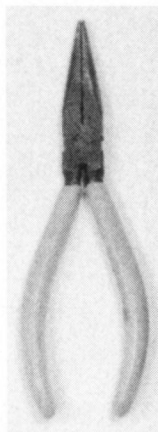
Soldering iron

If your speed-control leads don't have bullet connectors, you'll have to solder them to the motor terminals. Even if you buy a kit that comes with a motor that has leads soldered into place, you'll eventually have to replace the motor, so a soldering iron is essential. It's a key tool for experienced R/C enthusiasts; use it to build battery packs, to hard-wire motors and electronic speed controls and to repair broken wires on your radio equipment.

Allen wrenches

Allen-head screws are often used to hold parts together and/or in place. Associated's RC10 and Trinity's EV10 are two kits that use such screws throughout. Kyosho and Tamiya kits use metric bolts as well.

Inexpensive, L-shaped wrenches work well and are included with many kits. Also available are more expensive Allen "drivers," which have hardened-steel tips that are less likely to strip a bolt.





GETTING STARTED

MORE ADVANCED TOOLS

As you get more involved in R/C, you'll need more advanced tools. Of course, there are a million tools on the market but two, in particular, stand out: ball drivers and the electric rotary tool.

Rotary tool

A Dremel® MultiPro just can't be beat; there are at least three bazillion uses for this handy item. It's one of the most used and most appreciated tools in my box. It's commonly used on Lexan bodies for smoothing out corners, cutting away unnecessary material, trimming wheel wells and creating perfect curves.

Other great uses for this tool are: cutting bolts that are too long, trimming or smoothing rough edges on steel and aluminum, cutting a groove in the head of a stripped bolt, drilling and enlarging holes, deburring and grinding.... The list goes on forever.

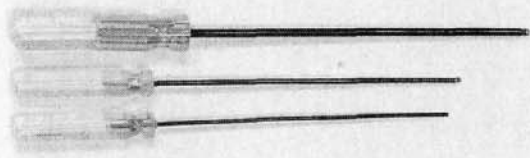


Ball drivers

Ball drivers are Allen-head tools that have rounded tips to allow you to tighten or loosen an Allen-head screw at an angle. When you're working on a kit, most of the screws will be accessible, but when the vehicle has been assembled, access to some of the screws will be partially blocked by other parts, and they'll be impossible to adjust with conventional Allen wrenches. Ball drivers allow you to reach them; they also have very long shafts that can reach into confined areas. Unlike regular Allen wrenches, they aren't L-shaped, so they do not require any clearance around the handle when you're turning a bolt.

There is, however, one drawback to ball drivers: because their heads are rounded, there is less material in them, so they strip easily when turned. When this happens, all is

not lost. If you have a trusty Dremel tool you can use a cut-off bit to remove the stripped tip and create a regular Allen wrench that has a long shaft and handle.



Q How are shock-spring rates measured?

A A spring's rate is determined by the diameter of the wire and the number of coils it has and is expressed in pounds. If it takes 1 pound to compress the spring 1 inch, that spring will have a rating of 1 pound.

Q Why are there so many shock-mounting holes in my off-road buggy's shock towers?

A The additional holes allow you to adjust the suspension more precisely. The more vertical the shocks are, the stiffer the suspension; conversely the more laid-down (horizontal) the shocks are, the softer the suspension. Generally speaking, making a one-hole adjustment either way is like changing to a spring that is either a tad softer or harder than the one presently on the

QUESTIONS & ANSWERS

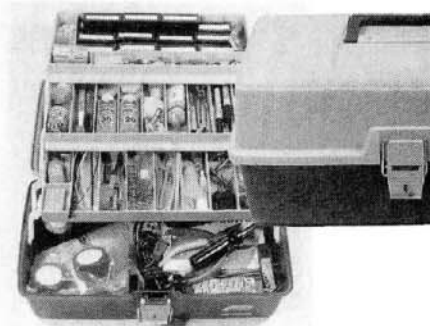
shock, but not as soft or hard as a spring in the next available size.

Q I've been told about 10 ways to charge my 6-cell 1400mAh battery packs. Which is the best way?

A It is best to charge them with a peak-rate. Less than 3 amps will produce longer run times, but less punch. Charging at more than 5 amps will give you more punch, but will shorten battery life. The extra power (hardly noticeable) is not worth destroying your packs for.

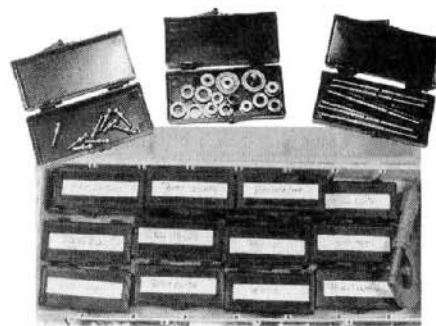
Q Why do some off-road kits have three-piece rims?

A Three-piece rims allow you to mount your tires without gluing them, and that makes it easy to change tires. They are, however, a little more difficult to work with than one-piece rims.



STORE IT NEATLY

A fishing-tackle box comes as close to being a perfect R/C box. I picked up a Plano box at Wal-Mart for less than \$15. It's rugged, convenient to carry and just the right size for all the essentials needed for a day at the track. Most tackle boxes have separate compartments in which you can neatly store small hand tools and parts. To hold spare parts—nuts, bolts, tie rods, brushes and whatever—I use small plastic cases. White labels make finding the correct part quick and simple.



FINALLY...

Most R/C kits can be properly assembled with small hand tools, patience and just a little skill. Use the right tool for the job. Do not use pliers when you should be using an Allen wrench. If you don't have the proper tool, get it. A little money invested up front will make for a more pleasurable building process and will ease repair jobs in the future.

The more involved you become with the hobby, the more need you will have for certain tools. You'll pick up a tool here and there and maybe collect some specialized ones, but 99 percent of the time, you'll find yourself repeatedly using the same tools, and I bet they'll be the ones discussed here.

*Addresses are listed alphabetically in the Index of Manufacturers on page 166.

PROJECT PRO STOCK

Tony Leung of Surrey, British Columbia, Canada, proudly presents the result of a two-year-long project—this pro stock '53 Ford. The truck is powered by a DuraTrax SRT .21 with a 4-shoe clutch and is controlled by a Futaba Magnum Sport. Tony has included many modifications such as front wheels and tires from a Parma Hemi Vette, rear tires from a Tamiya Lunchbox, custom aluminum rear wheels, a strip of leather for brakes and a chain-driven rear axle. Tony used only spray cans to paint the Parma body. Happy cruisin', Tony!



MERMAID MAGIC

This time, Ariel seems to have traded in her fins for a set of F1 tires. She and her pal Flounder can be found driving around Cleveland, OH, in Jack Kelsh's "Team Ariel" Tamiya 103L. It has a Teflon™/graphite friction-plate assembly, an oil shock, an aluminum heat sink, titanium screws, a graphite axle and HPI's graphite rear T-plate with diffuser. It won every race in Jack's local champ car series last season. Congratulations, Jack! We guess it pays to have a mermaid on board.



"Readers' Rides" is our way of recognizing the unique, innovative—and sometimes bizarre!—vehicles that our readers have created. Send us a sharp, uncluttered, well-exposed color photo of your car or truck (no Polaroids, please!), along with a brief description, to Readers' Rides, R/C Car Action, 251 Danbury Rd., Wilton, CT 06897. If we choose your photo, you'll receive a 6-month subscription to Car Action, or an extension of your existing subscription. You'll also be eligible for the fifth annual "Reader's Ride of the Year Contest" in the fall of 1996. Write your address and phone number on your letter and on the back of each photo you send, in case we need to contact you.

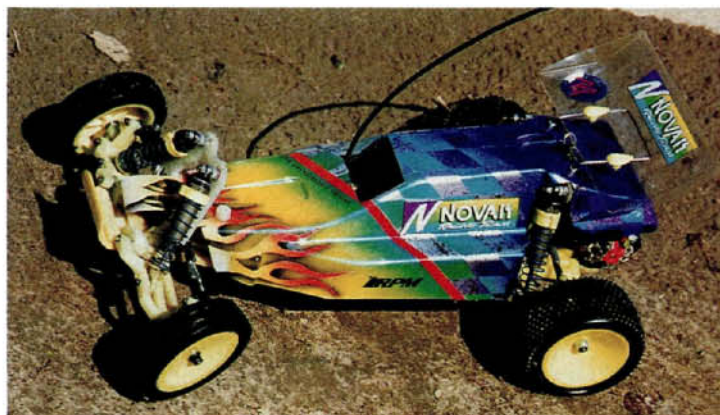


MEAN MACHINE

After reading "Project MRC MT-10S" in the September '95 issue of R/C Car Action, Craig Hoffman of Woodbridge, NJ, decided it was time to hop up his MT-10S. He added Associated shocks, ball bearings, MIP ball ends, a Novak 410-M5, Pro-Line Dirt Hawks, Deans Ultra Plugs, a Trinity Buggyweld motor, RPM ends and Lunsford turnbuckles. He topped off his truck with a Dahm's Commando body so he can bash around in style.

ONE NICE RIDE

This hot ride comes from Francis Lau of Fremont, CA. His Associated RC10 has an Elite stock motor, Deans Ultra Plugs, a Novak Tempest ESC, Trinity Hard Ones pinion gears and Pro-Line Rally Hawks (not shown). The buggy is controlled by a Futaba Magnum AM system. Francis spray-painted the body and the wheels to give his car that trick look.





**Truck
of
the Year**

TRAXXAS

Nitro Stampede

**Full of friendly features, this
monster just keeps growing on us....**

by GEORGE M. GONZALEZ

BECAUSE I WROTE the Thrash Tests on both the electric and nitro versions of the Traxxas* Stampede, it's even more of a pleasure for me to announce that we chose the Nitro Stampede as the 1996 *R/C Car Action* Truck of the Year. And the more I think about it, the more our choice seems to have been an obvious one: the Nitro Stampede was by far one of the coolest trucks I've ever reviewed.



Top: the Traxxas TRX-12 is one hot performer. With true ABC construction, a rugged pull-starter and double O-ring seals everywhere, it's also highly reliable. Right: the Traxxas machined, black-anodized Super Cooling head is a great hop-up for your Nitro Stampede. It dissipates heat more effectively, so you can run a slightly leaner fuel mixture without the risk of overheating the engine.

Powerplant Options

As you know, the Nitro Stampede comes equipped with the potent TRX-12 engine. We were pleased with this small-block 12's performance, but what amazed us most was its rock-solid reliability. Only after we had run nearly 2 gallons of fuel through this little nitro breather did it start to show signs of wear. We learned about the benefits of ABC construction firsthand by noting how long the piston and sleeve lasted. Then we installed a new piston and sleeve, and the mighty engine had a new lease on life (and Walter hasn't stopped playing with it since then!).

While we were at it, we decided to install the new Traxxas machined, black-anodized Pro Cooling Head heat sink. With this installed, you can actually run the engine a tad leaner, and this, in turn, will increase performance. The heat sink head will dissipate heat more efficiently than the stock unit, so it will run cool even when you use a slightly leaner fuel mixture.

If you have a never-ending need for speed, Traxxas now offers the Nitro Stampede with a sport-level .15 powerplant installed in the chassis. The Pro .15 is also an option. Check out these features!

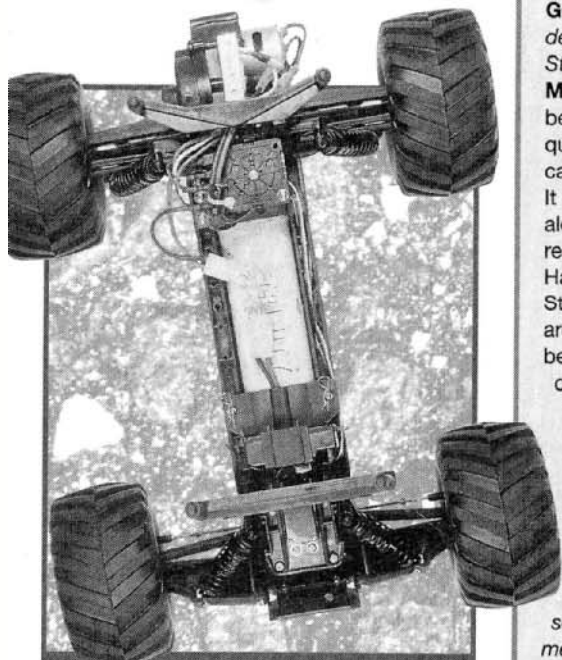
According to Traxxas, the Pro 15 features: true ABC construction; dual-ball-bearing-supported crankshaft; ball-bearing-supported clutch bell; double O-ring seals on the neck of the carburetor and on both the low- and high-speed needle valves; a large, finned, heat-sink head; and a carburetor barrel that's sealed with a rubber boot to protect it from the elements.



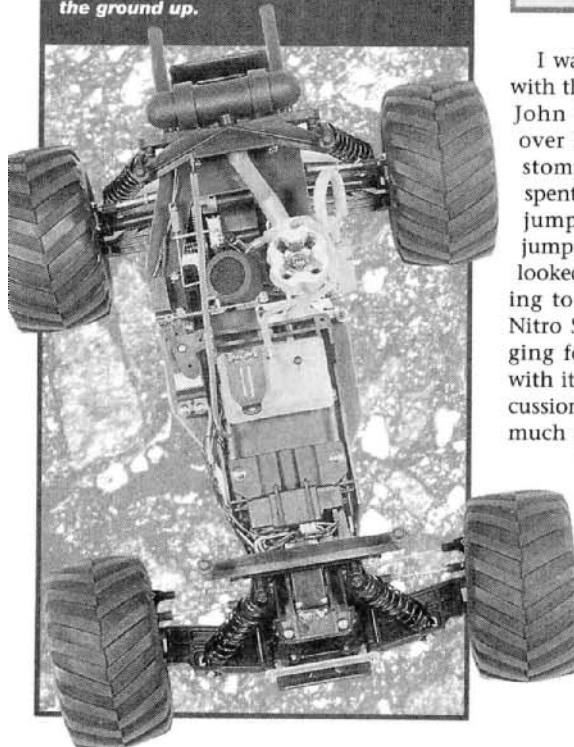
Beginning of a Heritage

Traxxas is well-known for innovative designs. Take, for instance, the Nitro Hawk, which many consider to be a true milestone. Not only is it the first 1/10-scale nitro-powered stadium racing truck to be designed by an American company, but it is also the only nitro truck to come fully assembled and ready to run. Add that the Nitro Hawk is based on 1/10-scale electric racing-truck technology, and you have the makings of a winning combination. Easy to get started, familiar uncomplicated chassis design and easy-to-find replacement parts—a winning combination that explains the popularity of these models.

Truck of the Year



Although the electric Stampede (above) looks very similar to the Nitro Stampede (below), they have very few parts in common; in fact, the only parts they share are the tires, molded shocks, front shock tower and body mounts. Basically, the Nitro Stampede was designed from the ground up.



Interview with the Designer

I talked to Traxxas engineer and designer Mike Hamilton about how the Nitro Stampede came to be, and I was amazed at how many changes were needed to transform the electric Stampede into a nitro nasty. In fact, I thought that many of the changes weren't necessary. Read on and you'll find out just how wrong I was.

GG: Why did Traxxas decide to design the Nitro Stampede?

MH: Why not? would be a better question! To be quite honest, the decision came from a higher entity. It was not my decision alone. I guess the main reason was that the Nitro Hawk racing truck and Stampede monster truck are two of our all-time best-sellers; so why not combine the two and make a nitro-powered monster truck? The Nitro Stampede is selling very well, so mission accomplished!

GG: What were some of the design parameters involved in manufacturing it?

MH: First and foremost, the tranny was our biggest consideration. We wanted a tranny that would be absolutely bulletproof. We spent a ton

on retooling, but it was worth it. The tranny's 0.8 metric-pitch gears will not strip. We even included a complete set of bearings and a slipper clutch for good measure! Then there's the chassis and rear skidplate; we had to retool to manufacture those parts, too. We could have done it more cheaply, but we decided to make it better instead.

GG: When you had a working prototype, did you think that you had achieved all your goals?

MH: We used all the electric Stampede's suspension pieces on the prototype, but we weren't satisfied. We thought that the suspension arms were a little too long for a truck with such a high center of gravity, and the nitro breather suffered from too much body roll. So we tried the SRT suspension pieces—our electric 2WD

racing truck; they're a tad shorter; the truck performed far better than we had even hoped for.

GG: Why isn't the Nitro Stampede available in kit form for those who like to build their own?

MH: We think that most sport-level racers would prefer to go out and play right away instead of having to spend hours building a kit. Besides, it only cost a few dollars more to provide a fully assembled truck, and when a product is supplied ready to run, we can be sure that it has been properly assembled; this, in turn, also guarantees a pleasant first experience for the racer. Traxxas does, however, provide a complete instruction manual for those who like to tinker.

I wasn't the only one who had a blast with the truck; coworkers Frank Masi and John "Doogie" Howell were also won over by the Nitro Stampede's ground-stomping ruggedness. Frank and John spent an entire day at a local BMX track jumping the truck over one table-top jump after another. On their return, they looked as if they had spent the day trying to break in a wild stallion! But the Nitro Stampede was unscathed and begging for more! They were so impressed with it that it was the topic of much discussion for weeks: "Man! this truck saw so much air..." "I think it actually crossed some time zones." That was all I heard for a while around here!

If that isn't enough of a testimony, our staff photographer, Walter Sidas, somehow snagged the Nitro Stampede off my workbench and played with it every day for months. This is the clincher, folks, because Walter may know a lot about taking

photographs, but he knows little or nothing about driving and tuning R/C cars or trucks. If Walter can tune and operate the Nitro Stampede, we can be sure it's user-friendly!

Traxxas has a reputation for designing and manufacturing high-quality sport level R/C cars and trucks; in fact, 90 percent of their product line is geared toward this rather large segment of the hobby. The Nitro Stampede is rapidly becoming one of the company's best-selling products, and that proves that they've accurately targeted their market and come up with a real crowd-pleaser.

The Nitro Stampede won the hearts of our entire editorial team; more important, though, it has won the approval of R/C enthusiasts all over the world. For this reason, *R/C Car Action* congratulates Traxxas for bringing us this mighty monster—the stupendous Stampede; it's a winner!

*Addresses are listed alphabetically in the Index of Manufacturers on page 166.

TAMIYA **Alpine A110**

by George M. Gonzalez

TAMIYA'S most recent innovation, the M-Chassis, is starting to show up under many different bodies and in many drive-train configurations. The original Tamiya Mini Cooper, which is based on the M01 chassis, kicked off this new R/C line, and enthusiasts went for it hook, line and sinker.

Since the Mini Cooper's introduction, Tamiya* has offered us several body shells; one of the most recent is the Renault Alpine A110, which is based on the M02 chassis. Like the other cars in the M-chassis family, the Alpine A110 features an incredibly detailed Lexan body and a decal set that allows you to recreate the Renault Alpine Rally car that raced at the 1971 Rallye Monte Carlo in Marrakesh, Morocco—North Africa.

KIT FEATURES

- **Chassis.** If you haven't figured it out by now, the M01 version is front-wheel drive (FWD) and the M02 version is rear-wheel drive (RWD). But the chassis are identical and could be set up in either configuration. The Alpine is intended to be RWD, but you could convert it to FWD quite easily by mounting the steering servo on the opposite side, swapping the front and rear body posts, installing a longer steering rod



Are these wheels and tires cool, or what? The tires have a tall sidewall that gives them a larger diameter than the other M-chassis cars.

(not included, but easy to make), and using a regular forward-rotation motor (the RWD M02 must use a reverse-rotation motor). I think this is a cool feature because you could have two completely



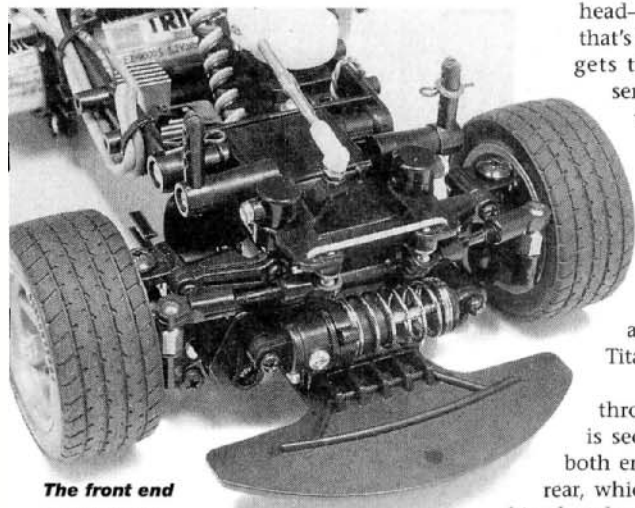
Vintage Renault

different cars with one chassis.

The two-piece chassis is molded of tough ABS plastic; combined with the front bulkhead and rear gearbox, the chassis makes a tough little tub that houses the battery and the electronics. A drag-link steering bellcrank pivots on plastic posts that are molded to the front bulk-



Why does Tamiya sell so many cars? Detail, baby!



The front end features an interesting drag-link steering system that's in front of the front bulkhead. A non-oil-filled coil-over mono shock is helped by spring-loaded suspension arms. Where are the oil-filled shocks, Tamiya?

head—a system that's a little on the sloppy side, but gets the job done. The steering servo is mounted vertically on the side of the chassis, and a piano-wire steering rod connects the servo saver with an arm on the steering-bellcrank system. I wasn't too keen on this system, so I substituted a Kimbrough* servo saver and a Lunsford* Punisher Titanium tie rod.

The battery pack slips through slots in the chassis and is secured by battery holders on both ends. It's mounted toward the rear, which should provide more rear bite, but the car still hooks a bit.

• **Suspension**—very simple and unique. Front and rear, non-oil-filled, coil-over mono shocks provide the damping, while spring-loaded suspension arms aid in

the spring-preload department. I think the system leaves a lot to be desired, but if the shocks are carefully set up, they will perform adequately (see Building and Setup Tips). Oil-filled shocks are a definite future upgrade.

• **Drive train**—a very efficient, three-gear transmission that has external and internal gears. The motor's pinion gear meshes with an external idler gear that meshes with an external/internal spur gear. The spur gear then meshes with an internal gear diff that has outdrives on both sides. Finally,

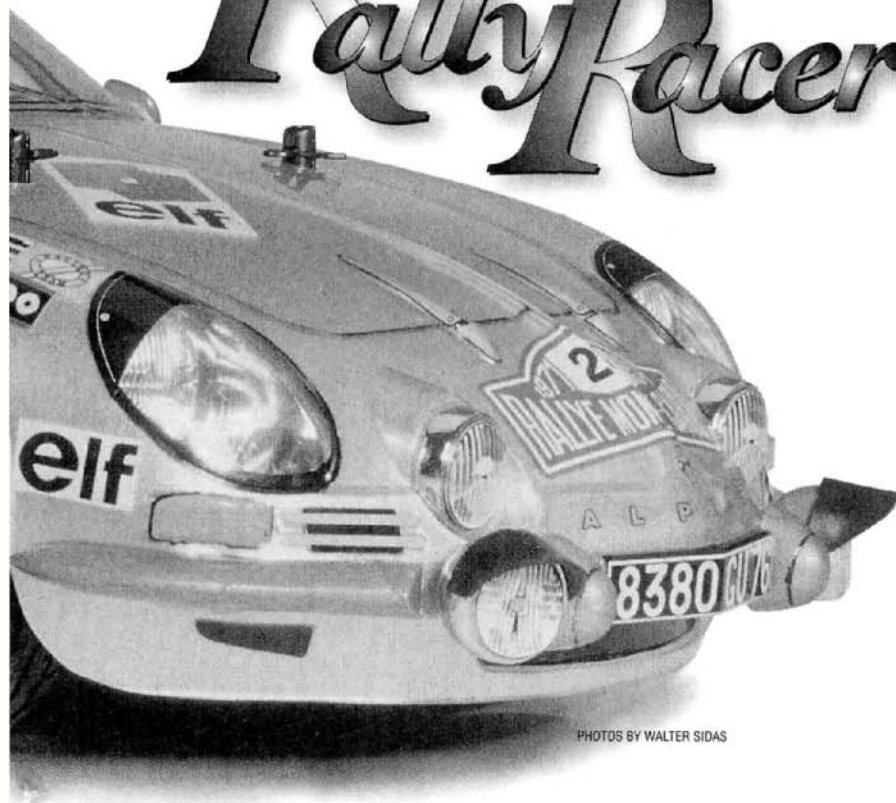
SPECIFICATIONS

SCALE	1/40
LIST PRICE	\$234
DIMENSIONS	
Length overall	14.8 in.
Wheelbase	8.3 in.
Width (F/R)	6.7 in.
WEIGHT (gross w/batteries)	2 lb., 14 oz.
CHASSIS	
Type	Molded tub
Material	ABS Plastic
DRIVE TRAIN	
Type	Sealed gear
Primary	Pinion/spur
Transmission	Dogbone/axle
Differential	Bevel Gear
Slipper clutch	None
Bearing/bushings	Plastic/bronze bushings
SUSPENSION (F/R)	
Type	Lower suspension arms with molded upper link
Damping	Non oil-filled, coil-over shocks w/spring-assisted suspension arms
WHEELS (F/R)	
Type	One-piece plastic
Dimensions (DxW)	1.5x.875 in.
TIRES (F/R)	
Type	Tall sidewall street treads
ELECTRICS	
Motor	540 stock
Battery	Not included
Speed control	3-step mechanical

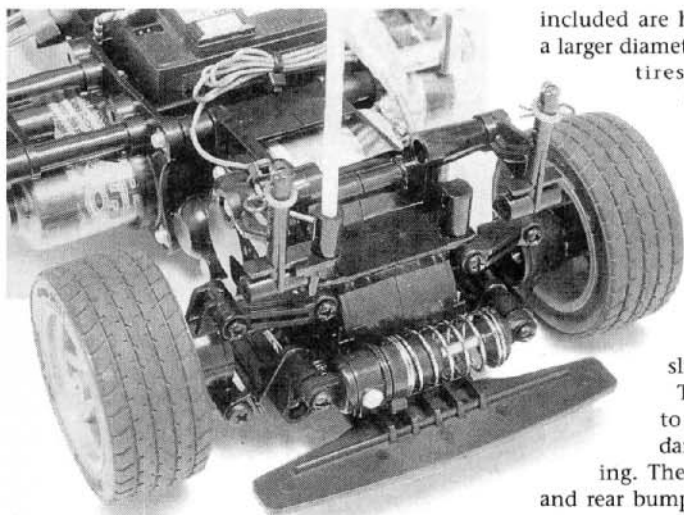
dogbones transfer the power to the wheels. A nifty little gear cover protects the external gears from the elements, and Tamiya has taken all the guesswork out of choosing pinion gears because there are only three choices—16-, 18-, or 20-tooth.

• **Wheels, tires and body.** The Alpine kit includes a complete set of highly detailed six-spoke gray wheels that look like the magnesium-alloy wheels you'll see on the full-scale Alpine; the lug nuts are even painted black for scale realism. Also

RallyRacer

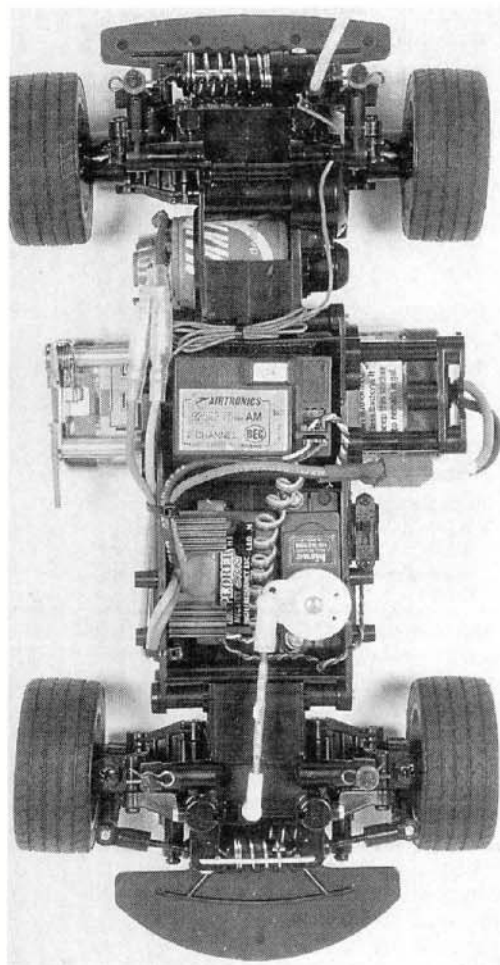


PHOTOS BY WALTER SIDAS



The rear end is identical to the front; this allows you to convert the Alpine to FWD. The battery tray is farther back for better traction.

As you can see from this bird's-eye view, Tamiya has done a fine job on the M-chassis design. I know; it is hard to tell which direction this car is facing.



included are high-profile tires that have a larger diameter than the other M-chassis tires; they give the Alpine a slightly higher stance that comes in handy on bumpy surfaces. Tamiya's super-soft M-compound tires (rear) and regular-compound tires (front)—foam inserts front and rear—keep the car's handling in check and make it hook slightly.

The Alpine A110 body is up to Tamiya's usual high standards, and its details are amazing. The kit includes molded front and rear bumpers, two sets of fog lamps, air scoops and a rearview mirror. In addition, the front headlights have lenses. What more could you ask for?



LIKES

- **Awesome body.**
- **Cool-looking wheels and tires.**
- **Highly adaptable chassis.**
- **Excellent instructions.**
- **Top-quality materials.**
- **Very easy to build.**
- **Incredible hop-up potential.**



DISLIKES

- **Must use reverse-rotation motor (very limited selection).**
- **Non-oil-filled shocks.**
- **Sloppy steering system.**
- **Handling is a bit squirrely.**

The decals allow you to replicate the 1971 Rallye Monte Carlo racer with all its sponsors, or to deck it out as a cool-looking vintage sports car.

TEST GEAR

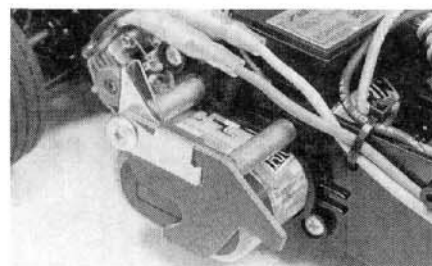
A budget-priced, but feature packed, Airtronics* Rival 2P transmitter sends the signals to its reliable 2-channel AM receiver. Those signals go to a Hitec* HS-525BB ball-bearing-supported, high-speed steering servo and Novak's* new, economically priced Explorer ESC.

For power, I used a Trinity* Street Spec battery pack and a stock Maxtec* Green reverse-rotation competition stock motor. This electronics combination offers wheel-spinning, chassis-sliding performance—without the high price.

PERFORMANCE

I tested the RWD Alpine at a nearby parking lot, taking along my FWD Mini

Cooper so that I'd be able to compare the two drive-train configurations. I was pleasantly surprised by how quickly the little Alpine got up to speed. The Green-can motor packs a wallop! I did notice that the car hooked whenever it took a



I installed the optional quick-change battery holder because I kept losing those pesky body clips that are fastened to the stock battery holder. The unit not only makes battery changes much easier, but it looks cool, too!

corner and quickly became unstable when it hit a bump in the road. I was prepared for this, though; my Mini Cooper has always been a handful to drive for the very same reason.

I've put a lot of scale miles on my Cooper, so I know its limitations. Out of the box, the Cooper tends to push going into corners and hook on the way out, and it also torque-steers whenever I goose the throttle. The Alpine, on the other hand, hooks going into the corners and pushes when exiting. It doesn't torque-steer; instead, the rear tires tend to hop when power is applied and traction is inconsistent.

Building & Setup Tips



- **Be sure to remove all the flashing from the tree-mounted plastic parts—especially from the suspension pieces.**
- **Step 1: liberally grease the large and small metal bevel gears in the gear diff. Put a light coat of grease on all the transmission gears. I use Aero-Car Technology's* Super Speed Gear lube. Try it; you'll be amazed by the results.**
- **Steps 2 and 11: tightly screw on parts C8 and C9 (upper control links and suspension-arm mounts). You don't want to discover that these parts are loose when you have the car halfway put together.**
- **Steps 7 and 12: suspension-arm springs. Up front, mount the silver spring on the left side and the black spring on the right side. Out back, you'll have to mount the silver spring on the right and the black spring on the left. If you don't, the suspension arms**

THINGS YOU'LL NEED

- 2-channel radio system.
- Two servos—for steering and the mechanical speed control.
- 6-cell battery pack.
- Battery charger.
- Paint for the Lexan body.



Factory Options

- Low-friction aluminum shocks—53155
- Manta Ray Ball diff—53070
- M-CHASSIS:**
- Ball-bearing kit—part no. 53206
- Universal-shaft set—53205
- Acto-Tuned motor—53251
- 4x65mm aluminum screw set—53234
- Aluminum motor heat sink—53241
- Front and rear stabilizer bars—53239
- Quick-release battery holder—53238

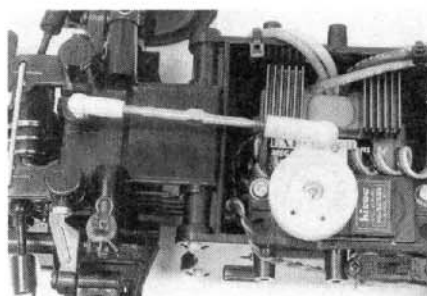
Considering their virtually identical chassis, I couldn't believe how differently the two cars ran. Out of the box, the Alpine, like the other M-chassis cars, requires work to get dialed; oil-filled shocks and better rubber would be a good start. Overall, the two cars "drive" completely differently, which illustrates the versatility of the Tamiya M-Chassis.

So which is better, FWD, or RWD? I like both, but for racing, I know I could get

lower lap times with the FWD configuration because a car that pushes is easier to drive than one that hooks.

FINAL THOUGHTS

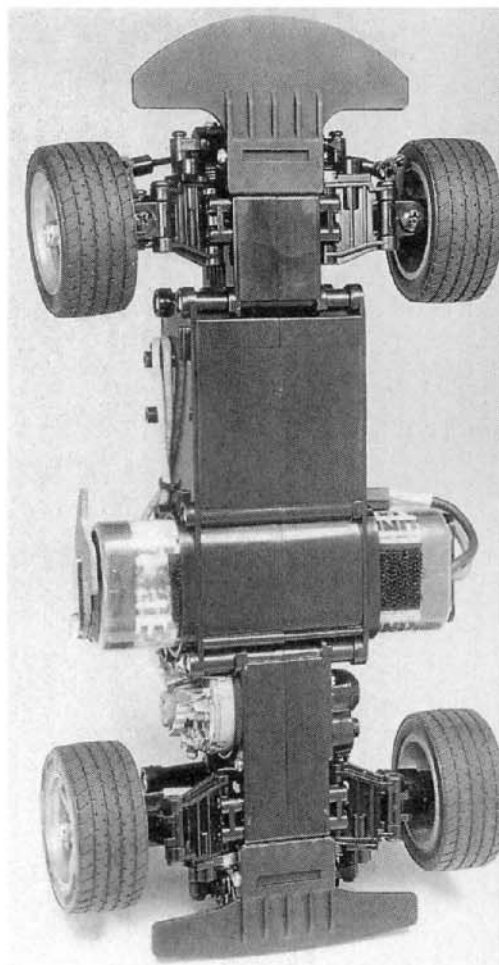
In my book, the Tamiya Alpine A110, like all M-Chassis cars, is a definite winner. These mini warriors are among the coolest cars to come around for a long time. It doesn't matter whether you go for FWD or RWD, because both configurations offer as much fun as watching a dozen cats in a yarn factory. The best part, though, is that you can switch from one to the other quite easily, so the



I chose a Hitec HS-525BB high-speed steering servo, and I replaced the stock piano-wire steering link with a durable Lunsford titanium tie rod. The Novak Explorer ESC is a smooth performer, and its narrow case makes it easy to install in tight places.

driving experience will never become mundane

If you're looking for that perfect car to hop-up or customize, look no further, because the Alpine is perfect for you. There are so many hop-ups available for it



The flip side reveals the narrow tub chassis. Check out the front and rear bumpers—pretty cool.

will bind severely.

- Step 14: it's easy to accidentally mount the front uprights backward; make sure the tabs on the uprights are facing downward. Again, you'll run into binding problems if you don't.
- Steps 15, 16 and 17. Note that the steering rods call for one short ball end and one long one. The smaller ball end snaps onto the ball joint on the steering-bellcrank arm, and the longer one snaps onto the ball joint on the steering hubs.
- Step 18: building the shocks. When cutting the rubber tubing that goes inside the shock bodies, be as accurate as you can be. You want two pieces of tubing that are exactly the same length. Although the instructions call for 14mm lengths, I cut mine 16mm, which lowered the car a tad for better cornering.
- Use plenty of grease on the shock shafts; the grease is the only damping the shocks will benefit from. I used Trinity Purple Stuff, which made the shocks actually feel like

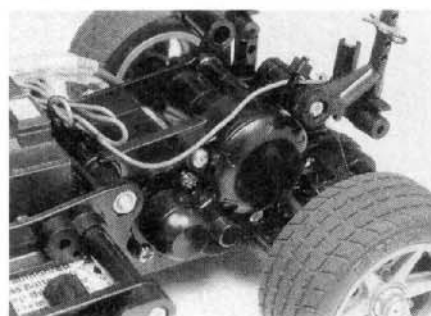
oil-filled units. Try it; you'll like it.

- The instruction booklet doesn't mention it, but you will need a reverse-rotation motor to power the car. If you follow the instructions carefully, you'll have successfully connected the leads that go to the stock 540 motor's wires backwards: green to yellow and yellow to green. This is OK because the stock 540 motor has zero timing and could run in reverse all day, but if you decide to install another type of motor, be sure it's a reverse rotation type or has adjustable timing; if it isn't, you'll be frying armatures like there's no tomorrow!
- Install the softer M-compound tires in the rear, or your car will hook like a boomerang.

As with all R/C kits, the more time you spend building the car, the less time you'll spend in the pits fixing things.

The Alpine is very easy to assemble, but as you can see by all these tips, mistakes could be made quite easily, so beware!

and the others in the line that you could easily be overwhelmed by all the choices. In a future issue of *R/C Car Action*, you will find my "Project Mini" epic—four of



A removable gear cover protects the external gears from the elements.

the hottest Minis you'll ever see! So stay tuned and get your drool buckets ready, because they're guaranteed to get your mouth watering.

**Addresses are listed alphabetically in the Index of Manufacturers on page 166*



NITRO BLAST FROM THE PAST

MGB



KYOSHO MGB Mk.1

by Mike Ogle

M IKEY LIKES IT. There—I've said it. Now that I've given away the conclusion to this review, you could bail out right now, flip the page and still have the gist of this story. But if you take a few seconds to look over the photos of the Kyosho* MGB Mk. 1, you may be struck with a sense of cautious disbelief. Those classic, very British body lines; the aggressive, just-right stance on its realistic wire wheels; that chrome body trim—this is an R/C car? A gas-powered R/C car, no less?

Yes, Kyosho has introduced its "Nostalgic Car" series of gas-powered, 1/10-scale cars and has defined an entirely new category of R/C vehicles. These replicas of 25-year-old-plus classic cars offer the dead-nuts-on look of some of history's greatest sports cars, paired with the performance excitement of a nitro-powered, 4WD, on-road chassis. Does this sound like an attractive combination? You bet!

When these cars were sneak-previewed in Chris Chianelli's "Inside Scoop," the little color photo was enough to pique my curiosity. What were these all about? Most gas cars I've been exposed to have green wheels and a giant, bulbous cylinder head popping out through the body somewhere—not high-scoring features in your average concours judging! These new Kyoshos, however, are different.

FEATURES

The Nostalgic Car series is based on Kyosho's reliable GP-10 Spider chassis

(reviewed in the March '96 issue of *R/C Car Action*). Its double-deck, duralumin, chassis-plate assembly provides a rigid platform. The upper plate, which holds the radio and fuel tank, is silver, and the lower main chassis plate is black. As stated earlier in this article (but, curiously, nowhere on the packaging), this is a 4WD car; the Kyosho GS-11X engine is mounted transversely mid-chassis, in front of the rear suspension. The GS-11X comes with two nice features already installed—an assembled clutch and a pull-starter. The exhaust is routed out through the rear-facing exhaust port (out the side of the engine) to a cast-aluminum muffler/manifold, and finally into a silicone tube that exits the rear of the car.

The transmission consists of identical front and rear sealed, bevel-gear-type diffs. The diffs are spun by a reliable belt-drive system that is connected to the motor by means of a two-jackshaft drive assembly. (This sounds more complicated than it really is. The parts count is actually pretty low for a 4WD gas car.) The brake assembly is a clever little set of metal clamps that squeeze a plastic disk. The car comes with friction dampers that look like regular oil-filled shocks, but they're really air-filled spring holders. (I'm sure these were provided to hold down the kit's price; however, to improve handling, the factory offers optional oil-filled shocks.) Although the molded, one-piece front- and rear-suspension links are not adjustable, the geometry on all wheels looks very good—no exces-

The Legendary MGB

T he famed British marque MG has a rich heritage; it actually predates the company's official founding in 1928 by William Richard Morris. MG stands, of course, for Morris Garage. The company's post-WW II models—the open-fender, wire-wheel TCs and TDs—were as popular as tea and crumpets in the Isles, and they defined the look of the early British sports cars.

MG's greatest success story has to be the MGB. Introduced in 1962, half a million were built before the model was discontinued in 1980. All MGBs featured an in-line four, 1798cc motor, and they had the same basic body lines, although later models lost their distinctive chrome bumpers in favor of more crash-proof—but much uglier—plastic noses. Even today, the MGB continues to be popular, with many still in daily use here in the States. There's even a national club—

the American MGB Association—devoted entirely to it.

Car lovers know the woes of many of the classic British automobiles: they're noisy and temperamental, and they have electrical systems that work intermittently. But who can resist that open-road, top-down feeling of a vintage European roadster? To many, the MGB is the embodiment of what driving should be—fun!



DETAILING THE BEAUTIFUL BRITISH BODYWORK

My favorite part of the kit was that realistic MGB body. It features all the difficult undercuts that can be produced effectively only with a multipiece mold (especially around the front of the car). Combine this body with the separate chrome-finish plastic bumpers and trim, and you have a static-model-quality replica. I only wish that the light body were made of a thicker, more durable polycarbonate. After all the work I've put into it, I'll be sheep-dipped if I'm going to subject it to race damage.

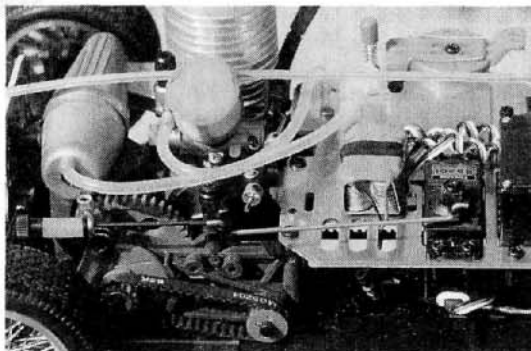
Here are a few finishing touches. On this particular car, my original thought was to paint it a traditional British racing green, but in reference materials, I saw a photo of an early 1960s MGB that looked simply elegant in Tuxedo black, so that's how I painted mine. The taillights and taillight bezels are one-piece chrome components, which I brushed with some Pactra* Candy Red (transparent red) and Tamiya* transparent gold paint to simulate taillight lenses. In the front, the headlights are two-piece assemblies—the chrome-finish plastic mounting bezel and a separate, line-etched, clear-plastic lens. Before you glue in the lenses, rotate the chrome bezels so that the raw, plastic area where they are attached to the parts tree is hidden, facing straight down; this way, the lenses' detail lines can be positioned to run horizontally. Pay careful attention to how the bumpers are bolted on. I shaved the bumpers' mounting "brackets" on an angle so the bumpers would line up parallel to the ground.

Among the interior features are very nice chromed Mylar, self-adhesive stickers for the dash details; I applied these after paneling the dash with "woodgrain" adhesive shelf paper. And just because I had them, I threaded on some 1980s-vintage RC10 chrome wheel "spinners" in place of the standard flanged nylon nuts. (I knew I was saving these for something!) Finally, to get the car's stance on the wheels just right, I spent a couple of hours tweaking the chassis' ride-height-adjustment grub screws (on the lower suspension arms) and the wonderfully adjustable front and rear body mounts.



Left: the realistic, chrome-wire wheels were accented by flowing thinned black paint into the areas between the spokes to give them added "depth." Chrome knock-off spinners from an early RC10 replaced the stock wheel nuts.

Below: Futaba's S9301 servos fit snugly into the cutouts in the upper chassis plate, and the muffler fits neatly crossways between the engine and the rear suspension components. The GP-10 chassis features an efficient, triple-belt drive system: two to drive the front end and a single short belt to drive the rear.



sive toe-in/out or weird camber angles.

The wheels and treaded rubber tires are more true-to-scale than most, especially those killer 48-spoke wire wheels. For better definition and "depth" in the spokes, I gave them a "wash" of thinned flat black Testors' enamel. Be very careful; the chrome plating is not very thick, and you can rub through it.

TEST GEAR

I opted for Futaba's* S9301 steering and throttle servos; they fit perfectly in the pre-cut slots for the servos, and they were strong enough to provide control. Because I never want to overtax the components most directly responsible for establishing the "feel" of a car, I've always liked to use

stronger torque-rated servos than most would deem necessary.

Just because I had one lying around, I used an Airtronics* receiver and transmitter; to make everything compatible, all I had to do was switch the red and black wires on the servo leads. Because I wanted to maximize scale appearance, I ran the radio antenna along the center of the car, under the body. This works just fine if you run solo, but in competition, you'll need to extend the antenna so your car will be able to "hear" better.

THINGS YOU'LL NEED

- 2-channel radio with two servos.
- Ni-Cd battery pack for the receiver.
- Glow-plug igniter (additional glow plugs are recommended).
- 10 to 15-percent nitromethane fuel.
- Fuel bottle (it makes life a lot easier).



Factory Options

- Touring shock set—part no. KYOC5704.
- On-road spring set—KYOC5858.
- Stabilizer set—KYOC5951.
- Ball-differential replacement set—KYOC2139.
- Front one-way unit to replace the front diff—KYOC3734.
- Ball-bearing set—KYOC2230.
- Wide wheels, mesh (Silver)—KYOC6531.
- Wide, slick, high-grip tires—KYOC6250.
- GP-10 tuned pipe—KYOC4196; requires manifold—KYOC4574.
- 2-speed transmission—KYOC6174.
- Adjustable rod set—KYOC5380.

SPECIFICATIONS

SCALE 1/10
LIST PRICE \$369.99

DIMENSIONS

Length overall 15 in.
Width (F/R) 7.75 in.
Wheelbase 10.25 in.

WEIGHT (gross) 3 lb., 2 oz.

CHASSIS

Type Pan
Material Aluminum

DRIVE TRAIN

Type Gear/belt
Differentials (F/R) Bevel gear
Transmission Gear
Braking Disk
Bearing/bushings Bushings

SUSPENSION (F/R)

Type 4W, independent double-wishbone
Damping Plastic coil-over shocks

WHEELS (F/R) 1-piece plastic spoke
TIRES (F/R) Pneumatic rubber, on-road tread foam inserts

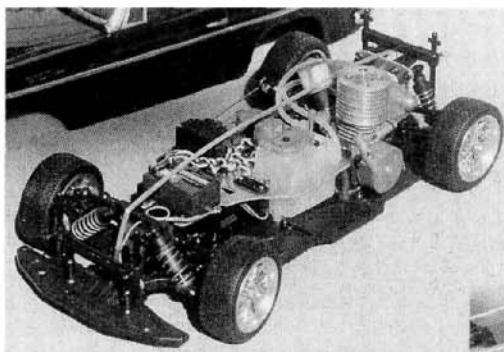
POWERPLANT

Engine Kyosho GS-11X pull-start (included)

BODY MGB

ELECTRONICS Airtronics Rival 2P radio, Futaba S9301 servos

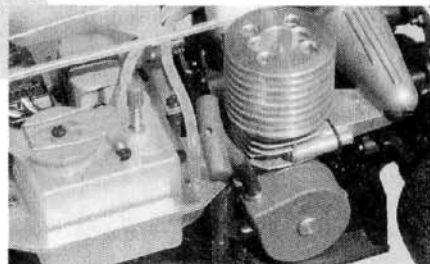
tions when I set the needle valves: screwed in all the way, and then out two full turns. For the first few tankfuls, run more fuel through the engine than it really wants. It will sputter, choke, try to stall, run more slowly than heck and throw blue smoke for a while, but this is how you break in an R/C engine. It doesn't have a separate oiling or cooling system like your full-size car. All the engine's oil is mixed with its fuel; so the more fuel you run through it, the more effectively the engine is lubricated and broken in, and the less likely it will be to seize on your first afternoon out. Be patient in the early sessions. Don't rip right out at full speed, and don't let the car lean



Kyosho's MGB is based on the GP-10 gas car chassis, which just fits under the compact sports car body.

PERFORMANCE

The GS-11X is a relatively friendly powerplant; it fired up on the third pull and produced that distinctive, "great, big, angry insect" buzz. To prevent the car from flaming out, I had to fiddle with the idle-stop screw next to the carb barrel. For a rich, initial break-in setting, I followed the instruc-



The GS-11X engine provides all the horsepower you will need; it features a handy, recoil, pull-starter. The 75cc fuel tank has a flip-top cap and a spring-loaded priming pump.



LIKES

- Beautifully detailed body and wheels.
- Kyosho GS-11X engine is reliable and easy to start.
- Simple drive system and chassis make assembly quick.
- Many factory options.



DISLIKES

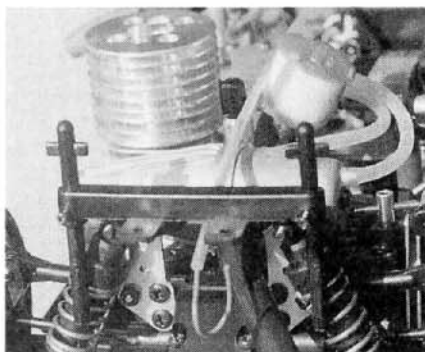
- Wheels and tires, though scale in appearance, perform only adequately.
- Absence of oil-filled shocks.

out of fuel. You'll get your shot at qualifying for the A-Main later, but not if you're stuck back in the pits with a broken connecting rod.

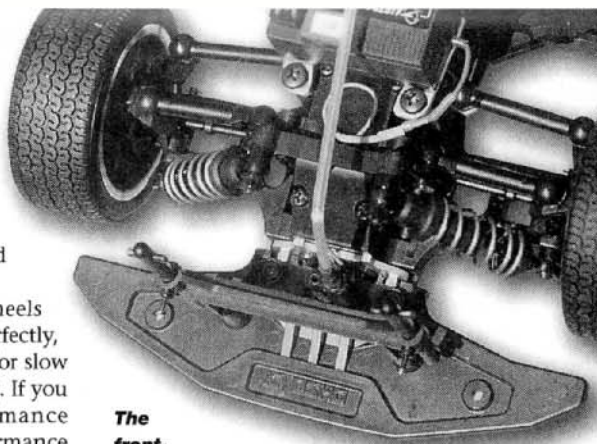
Although the plastic brake disk didn't seem adequate to stop this 3-pound-plus car, it was surprisingly effective, and it didn't show signs of excessive wear (like, say, completely melting!). Spend your hop-up money on oil-filled shocks; these will really make a difference to handling; the stock "bouncers" that came with the kit live up to their name. At low speeds and on smooth surfaces, the chassis handles well

and predictably. Grab more throttle, however, and the lack of damping becomes apparent; the chassis wallows and hops, and response becomes jerky.

The kit's stunning tires and wheels replicate those of the real MGB perfectly, but they are definitely more suited for slow speeds and static display than racing. If you plan to boost the MGB's performance through hop-ups, then high-performance wheels and tires from Kyosho's long list of GP-10 accessories are a must.



The exhaust is routed out through the rear of the car through a silicone tube. The adjustable body mounts help set the body at the proper ride height.



The front-suspension arms are solid, one-piece molded units. Although they aren't adjustable, the molded upper links provide the right geometry.

Aftermarket oil-filled shocks are a recommended upgrade.

FINAL THOUGHTS

The Kyosho MGB Mk. 1 is a great little replica of one of the world's most beloved sports cars; it could be irresistible to the hobbyist who wants it all—scale-realism and gas-car performance. It's not an all-out racing car, but you'll be able to hop it up extensively to achieve respectable lap times. If you're like me, you would probably buy this car for its looks alone. Yep, Mikey likes it!

**Addresses are listed alphabetically in the Index of Manufacturers on page 166.*

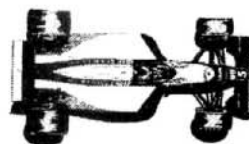
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Box stock Legends, 21tooth gears and cap tires, (Entry \$ 50 includes a hand out motor)

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NO. OF EXTRA MOTORS(2 per Class) \$22 ea. _____

Class 1 _____ Frequencies 1 _____ 2 _____ 3 _____

Class 2 _____ Frequencies 1 _____ 2 _____ 3 _____

Class 3 _____ Frequencies 1 _____ 2 _____ 3 _____

Total Enclosed \$ _____ Make Checks Payable to CIRCAR (sorry no refunds)

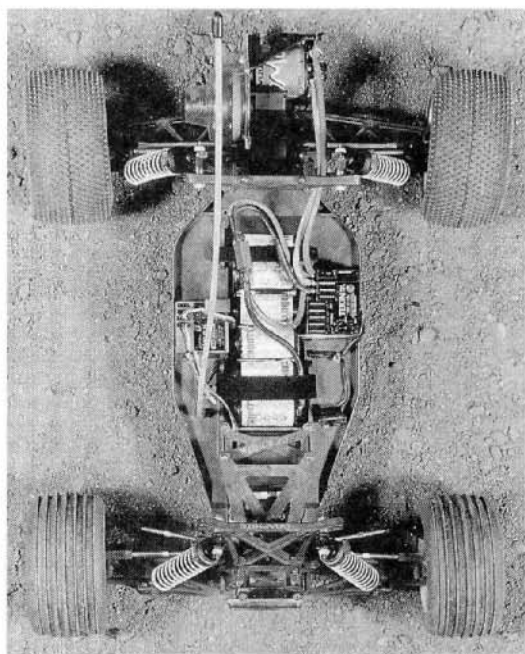


Tuning and
modifying the

TEAM LOSI Double-XT

by John Howell

OUT OF THE box, Team Losi's* Double-XT is an awesome truck. When modified, it's tough to beat. In the hands of Losi's top factory drivers, it has won many ROAR and NORRCA National titles; in my hands...well, I have made the A-Main at a few races here and there, but I honestly can't claim true greatness yet (through no fault of the truck, mind you; we'll have to chalk it up to driving style!). I've tried many different mods since I initially reviewed the Double-XT in our January '95 issue. I've raced the truck regularly at JP's track in Seymour, CT (a small, tight, technical track with a somewhat rough surface) and at the Long Island Raceway in Long Island, NY (a larger, smoother track with longer straights and bigger jumps). Here's what I've done with it so far.



- **Graphite components.** For my first mod, I added all of Team Losi's graphite components—chassis, suspension arms, top brace and shock towers. The graphite pieces make the truck more rigid overall, which allows the suspension to work more efficiently. Not only do the graphite components make the chassis more rigid, but they're also lighter than the stock pieces.

- **Shock shafts.** Losi's titanium-nitride-coated shock shafts are much smoother than stock shock shafts and, thanks to their special coating, they also last much longer. I have yet to bend or wear out one since I installed them.

- **Lightweight aluminum suspension balls.** Losi's aluminum suspension balls help reduce unsprung weight so the suspension can react quicker.

- **Aluminum top shaft.** By replacing the standard steel top shaft with Losi's new, lighter, aluminum piece, the transmission now has less rotating mass, which allows the truck to accelerate harder and faster. This is beneficial off the start, exiting out of turns and especially if you need to jam on the throttle and get up to speed quickly right before a set of doubles or triples.

- **Lightweight aluminum motor plate.** Losi's aluminum motor plate looks cool, it's polished, and it's lighter. What else do I need to say?

• **Titanium turnbuckles, hinge pins and shock mount.** The stock steel turnbuckles and hinge pins are fine to start out with, but after you've come up short on a few jumps or miscalculate how close you are to the boards, you'll soon realize that titanium turnbuckles and hinge pins should be first on your list of mods. I prefer Lunsford's* titanium products because of their excellent fit and finish. With Lunsford's titanium Quick-Tune shock mount, you can remove your shocks and shock mounts quickly for quick damping and spring changes on the shocks, or you can rearrange the shock's position on the top of the shock tower.

• **Braces.** For extra support, I used Trinity's* front and rear aluminum braces. The front brace is attached to the front tip of the hinge pins, and it doesn't allow the suspension arms to flex. The rear brace is attached to the top of the gearbox, and it helps strengthen the entire rear of the chassis.

PARTS LIST

DEANS

- Ultra-Plug

TEAM LOSI

- Graphite chassis
- Graphite suspension arms
- Titanium-nitride shock shafts
- Lightweight-aluminum suspension balls
- Aluminum top shaft
- Lightweight-aluminum motor plate

LUNSFORD

- Punisher titanium turnbuckles
- Titanium hinge pins
- Titanium Quick-Tune shock mount
- "Fat Boy" motor screws

TRINITY

- Kinwald chassis braces (both front and rear)
- Dirtinator (12-turn double) modified motor
- Midnight motor (for stock class)
- World Tech 30A cells
- Buggy Grip

JR PROPO

- NES-4735 steering servo

TEKIN

- G-12c ESC

NOVAK

- NER-3FM receiver

FACTORY WORKS

- Axle spacers (front and rear)

YOKOMO

- Assorted titanium screws

SETUP

FRONT END

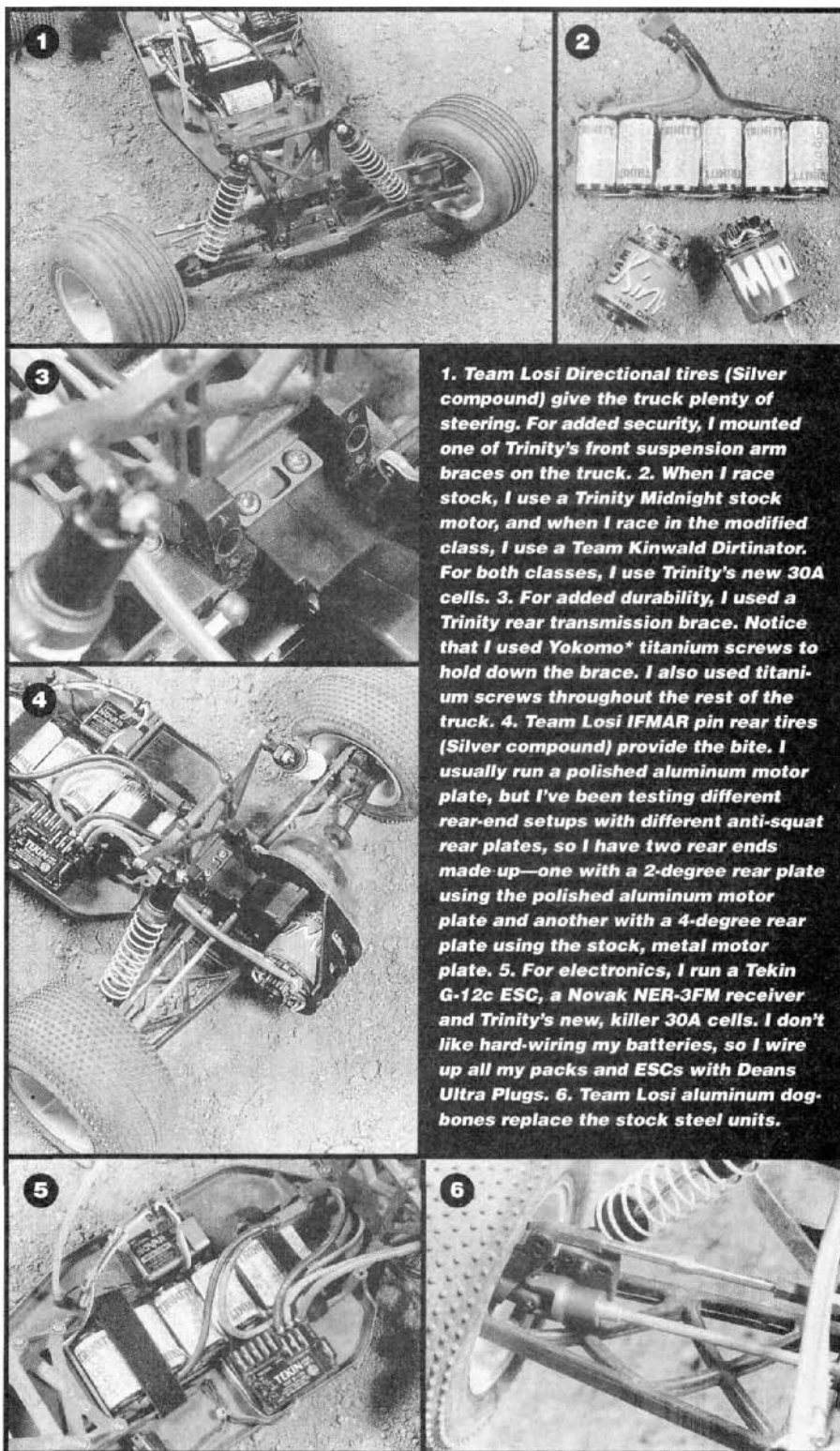
- 1 degree toe-in
- Directional tires (Silver compound)
- Yellow springs
- 5-5-6 pistons with 30W Trinity silicone shock oil

REAR END

- 3 degrees toe-in per side
- 1 degree negative camber
- IFMAR pin tires (Silver compound)
- Yellow springs
- 56 pistons with 25WT Trinity silicone shock oil

BATTERY PLACEMENT

Most of the time, I use two pieces of foam—a small piece was used in the back of the battery box, and a larger piece was placed in the front to position the batteries more toward the rear without having them placed all the way toward the back.



1. Team Losi Directional tires (Silver compound) give the truck plenty of steering. For added security, I mounted one of Trinity's front suspension arm braces on the truck. 2. When I race stock, I use a Trinity Midnight stock motor, and when I race in the modified class, I use a Team Kinwald Dirtinator. For both classes, I use Trinity's new 30A cells. 3. For added durability, I used a Trinity rear transmission brace. Notice that I used Yokomo* titanium screws to hold down the brace. I also used titanium screws throughout the rest of the truck. 4. Team Losi IFMAR pin rear tires (Silver compound) provide the bite. I usually run a polished aluminum motor plate, but I've been testing different rear-end setups with different anti-squat rear plates, so I have two rear ends made up—one with a 2-degree rear plate using the polished aluminum motor plate and another with a 4-degree rear plate using the stock, metal motor plate. 5. For electronics, I run a Tekin G-12c ESC, a Novak NER-3FM receiver and Trinity's new, killer 30A cells. I don't like hard-wiring my batteries, so I wire up all my packs and ESCs with Deans Ultra Plugs. 6. Team Losi aluminum dog-bones replace the stock steel units.

DOUBLE-XT

• **Motor.** I mostly race in the modified class with a hand-wound, epoxy-balanced Trinity Dirtinator, but if I race in the stock class, I toss in a Trinity Midnight. When I first started to race the truck, I was using a 15-turn quad Dirtinator, but it didn't provide enough punch for the track layout at the Long Island Raceway. (I needed instant tire-shredding horsepower to help me clear the dreaded doubles and triples.) Recently, I was racing there with Team Trinity/Team Losi drivers Greg Hodapp and Brian Kinwald, and Trinity's Neal McCurdy was on hand to

tune their motors. I explained to him that I thought that the 15-turn wasn't the appropriate choice for that track, and I asked him if he could tune my motor. When he handed it back to me later, it was equipped with a 12-turn armature. I had so much horsepower during the next heat that I almost couldn't drive the truck! I turned down the torque limiter on my ESC, and that helped to smooth it out.

• **Batteries**—Trinity 30A World Tech cells. I practice with some older SCR and SCRC packs, but when it comes time to race, I

pop in my new Trinity 30A World Tech cells. They're great for modified racing, and I never worry about making run time. Of the two packs that I have, both have numbers in the 247 to 250 range. I use Deans* Ultra Plugs on all my battery packs.

• **ESC.** The Tekin* G-12c is quickly becoming one of my favorite speed controls, and it sits faithfully in my Double-XT. It's ultra-smooth, provides great run time, gives me full control right to the end of the pack and, most of all, I can re-solder the wires to the external posts if need be. It features high-frequency operation, GoldFETII transistors, a built-in motor diode, 5A BEC, a Turbo Start mode (full power off the start) and QuickTune setup. As with my battery packs, I use the other half of the Deans Ultra Plug on my ESC.

• **Receiver.** I've never been glitched using my trusty Novak* NER-3FM 27 MHz receiver. The compact NER-3FM operates at a very low battery voltage, and it weighs less than an ounce.

• **Axle spacers.** Know why I like the Factory Works* axle spacers? Because I'm always accidentally tightening my wheels too much, and they're always binding up. With the Factory Works spacers, it's impossible to do that. Slip the spacers in between the bearings in the front wheels and between the bearings in the rear hubs, and you're all set. I can now crank down those wheel nuts as tight as I want!

• **Tires.** I used a wide variety of Team Losi tires when I raced this truck. I mostly used the same angled-rib front tires in Silver compound for the front, and I experimented with IFMAR pins and step pins in Silver compound in the rear. The IFMAR pins ended up being the tire of choice more often than not.

• **Traction additive.** Before each heat, I would "sauce" my tires with Trinity's Buggy Grip traction additive. Not only did I notice that my tires had more traction with the Buggy Grip, but I also noticed that I wasn't going through tires as quickly. Overall wear actually decreased with the Buggy Grip.

PERFORMANCE

I've found the Double-XT to be an extremely fast, stable and reliable racer (trust me on that one; I've pushed the truck to its limits, and the only thing I managed to break was the rear pivot support plate when I came up short on a gnarly set of triples).

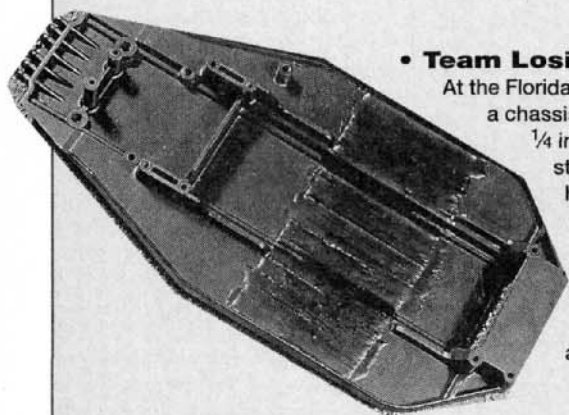
I've learned a few things about the Double-XT since I've been racing with it at JP's and L.I.R. When I first started to race the truck, it was equipped with the

New Losi Suspension Pieces

As I started writing this "2nd Look" for my truck, Jack Johnson of Team Losi sent me two items—a lengthened chassis and the new 3-degree-toe-in rear end—that apparently will greatly enhance the Double-XT's performance. Both of these items are in the final prototype stages, so they should be available soon. I have yet to test both items extensively, but as soon as I get more track time with them, I'll let you know what I think. Maybe you'll see my "3rd Look" soon.

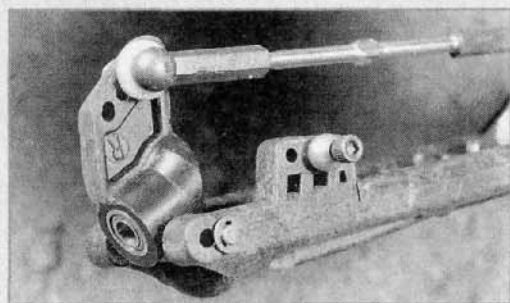
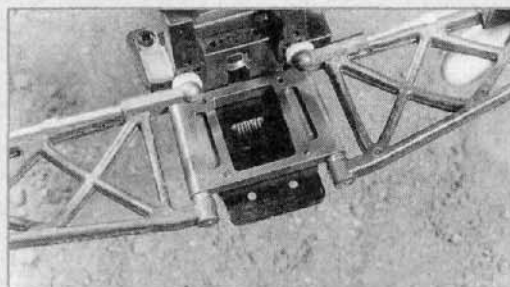
• Team Losi lengthened chassis

At the Florida Winter Champs, Team Losi tested a chassis that had been lengthened by $\frac{1}{4}$ inch. The lengthened chassis adds stability to the truck, especially on high-bite, blue-groove tracks. The chassis I received was made of standard Stiffezell and had a .25-inch section epoxied into place. Production versions will be available in regular Stiffezell and graphite.



• Team Losi 3-degree toe-in rear end

The new rear end incorporates the toe-in into the pivot support, not in the hubs where it used to be. The new pivot support will be separate from the bottom plate, and it will be available with either 2 or 4 degrees of anti-squat. The new rear-end kit will come with the pivot plate, pivot support, two suspension arms that include the newest additional outer hole, two 0-degree hubs and all the miscellaneous assembly hardware.



first run of steering parts (the ones that only had one set of holes for the drag link), and I didn't think it had enough steering. Apparently, other racers who sit here in the editorial office with me thought that I was driving into the corners a little too hot, but I thought otherwise. I like my "pitch it and pin it" style of driving! I put on the new white nylon pieces that feature two pairs of drag-link holes instead of one pair (both sets of holes give the truck more steering—one more so than the other). I placed the steering link in the two holes that provided the most steering. When I did that, the truck had entirely too much steering, so I placed the link in the set of holes that provided a little less steering, and it smoothed out the truck's dartiness.

I also raced the truck for a long time with a 2-degree anti-squat rear plate. I never had a problem with stability at speed, which helped on the long straightaway at L.I.R., but I always had a problem coming out of turns on power. The rear end would always feel as if it was going to slide out on me, and I often found myself having to roll off the throttle and then get back on it when the rear end had settled down. I switched over to a 4-degree anti-squat rear plate (after I had cracked my 2-degree plate on that exceptionally nasty triple jump), and I noticed a big improvement coming out of turns while on the throttle. Switching between the two makes a big difference in performance.

The Double-XT is very forgiving and is exceptionally stable on rough tracks. No matter how rough the surface was at certain tracks, I could always count on my truck to tackle the terrain with confidence. When I handed over my radio to other drivers, they would often comment on how smoothly my truck drove. At the Long Island Trinity race, I got both Kinwald and Hodapp to take my truck around for a few laps, and both of them felt it was pretty dialed-in. After running the truck for a few laps, Kinwald passed along a few pointers on how to set it up even better. I messed with the front ride height and the shocks, and it was even more hooked-up.

After all the time I've put into racing the Double XT, I'd have to say that it's one of my favorite R/C rides to race. In the future, I plan to experiment with travel limiters, and I also plan to test out Losi's new rear end and lengthened chassis (see sidebar on previous page). Until then, stay tuned.

*Addresses are listed alphabetically in the Index of Manufacturers on page 166. ■

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6 CELL 285+	\$28.00 EA.	RACE PREP 24"	BATTERY CLAW
6 CELL 294+	\$38.00 EA.	TRINITY 24" 36"	MOTOR STATION
6 CELL 300+	\$52.00 EA.	LIGHT SPEED 24"	HOOD ALIGNMENT TOOL
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6 CELL 340+	\$32.00 EA.	9 SCLE. THRU 18 DBLE.	BRUSH SPRINGS
6 CELL 350+	\$38.00 EA.	MOTOR BRUSHES	B & T COPPER BARS
6 CELL 360+	\$48.00 EA.	Extreme HC-80	BATTERY BRAID
6 CELL 370+	\$65.00 EA.	RACE PREP R, P & H - CUT	14 GAUGE WIRE
4 & 7 CELL ALSO AVAILABLE		TRINITY SILVER	SHRINK "3" COLORS
SANYO RECHARGEABLE "AA"		BUD HOLLOW	BATTERY TAPE
SANYO N1000 SCR CELLS \$3.50 EA.		NEW CAM #5812S & #6220L	BUDS DIFF BALLS
SANYO N800 AR CELLS \$3.50 EA.		MATRIX 3502	EXCELL MOTOR SPRAY
4 CELL RECEIVER PK. \$10.00 EA.		McLIN FIDDLE STICK	SCAT PRODUCTS "OIL"
5 CELL RECEIVER PK. \$18.00 EA.		PRO-FIT AXLES	IRRGANG RACING PRODUCTS
EDGE COMM STICKS		PROFIT CAN OPENER	ULTIMATE DIFF ASSEMBLY
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TRINITY **Evolution 10F**

by DOUG MERTES

LET'S SAY YOU'VE been messing around in the R/C hobby for a year or two. You and your buddies have been racing in the local spec class, and now you're ready to move up to the next skill and speed level. In many parts of the country, that means moving out of the oval classes and into the road-

by the expense of such setups—and paranoid about destroying that new graphite chassis on the parking lot. What you need is a reasonably priced, easy-to-tune, on-road chassis that isn't too complex. It has to be durable, because you can expect to hit more than your fair share of walls for the first

is now sitting on your hobby dealer's shelf!

I'm talking about Trinity's* new Evolution 10F (the "F" stands for fiberglass). It's a less expensive, easy-to-upgrade version of the car that Joel Johnson used to win the very first IFMAR 1/10-Scale On-Road World

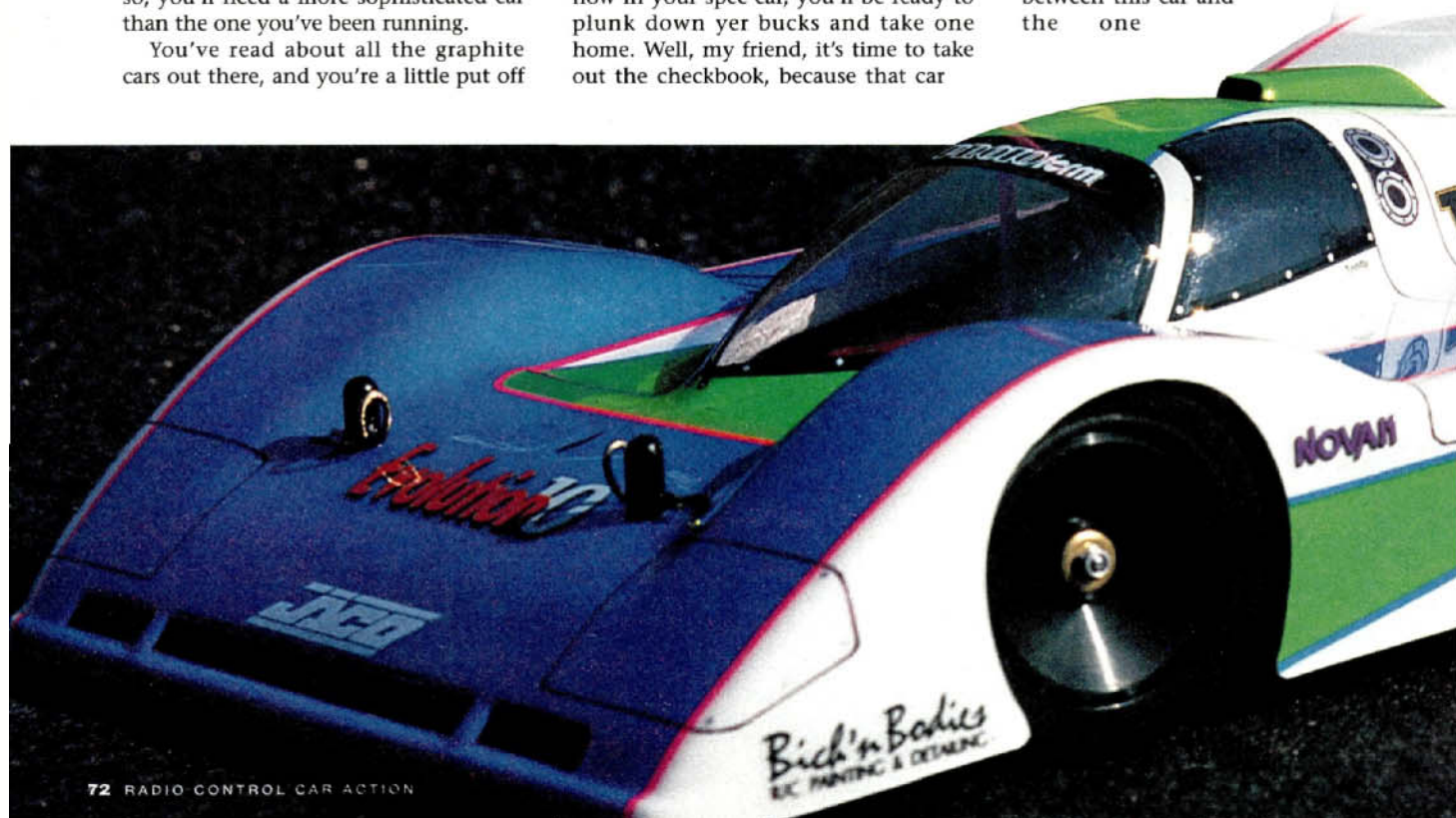
*high speed on-road
performance for the masses*

course stuff, where drivers turn their cars both left and right. You want to learn how to tune your new car's chassis, and you want to experiment with things such as caster and camber settings, gearing and tire selection. To do so, you'll need a more sophisticated car than the one you've been running.

You've read about all the graphite cars out there, and you're a little put off

couple of months until you learn how to turn the beast properly. If it takes stick-pack batteries (like the ones you already own) instead of more expensive in-line or saddle-type packs, and it's compatible with the electronics that are now in your spec car, you'll be ready to plunk down yer bucks and take one home. Well, my friend, it's time to take out the checkbook, because that car

Championships in 1992. This design has proven to be a versatile, user-friendly winner on local parking lots and carpet tracks, as well as in regional and national competition. What are the biggest differences between this car and the one



that Joel used to take home that big trophy?

KIT FEATURES

• **Fiberglass or graphite?** Ask any R/C guru who's truly in the know, and he'll tell you that there's a lot of misunderstanding about the value of graphite compared with fiberglass. Because all the bigtime fast guys use graphite chassis plates and stiffener bits, we should, too, right?—not necessarily! A well-designed fiberglass piece will be almost as stiff as its graphite counterpart. The graphite part will be lighter and slightly stiffer, but it will also be more brittle and more prone to being chipped and to shattering when you whack that corner board extra hard. Sure, the fiber-

glass will be a little heavier, but most entry-level road-course classes have a fairly high minimum weight (in some cases, 45 ounces instead of 42 ounces for the advanced classes), so weight is less of a problem than you might think. By the time you're ready for a lighter car, you can upgrade to graphite using the parts available from Trinity. You'll be hitting the wall a whole lot less by then, too, so (hopefully!) the money you spend will be a better investment.



SPECIFICATIONS

SCALE 1/10
LIST PRICE \$199

DIMENSIONS

Overall length 13.5 in.
Wheelbase 9.85 in.
Width (F/R) 8.3/9 in.

WEIGHT (gross, RTR) 44 oz.

CHASSIS

Type Single-plane pan
Material Fiberglass

DRIVE TRAIN

Type Direct drive
Primary Pinion/spur
Transmission Solid axle
Differential(s) Ball
Slipper clutch None
Bearings/bushings Bearings

SUSPENSION

Type (F) Reactive caster w/upper A-arm
Damping O-rings and silicone fluid
Type (R) Single central pivot w/twin trailing locating arms
Damping Oil-filled shock and damper tube

WHEELS

Type (F/R) Nylon
Diameter 1.8 in.

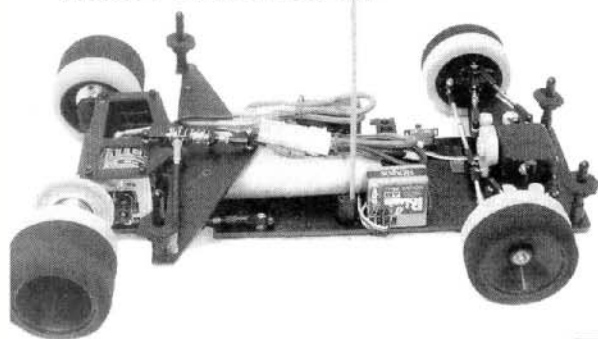
TIRES

Front Blue-compound "Spec" foam
Rear Green-compound "Spec" foam

ELECTRICS

Motor, battery, ESC Not included

TRINITY EVOLUTION 10F



This Evolution 10F is the design used by Joel Johnson to capture a world championship!

• **Bearings or bushings?** The kit comes with a full set of bearings for the pro-style differential and for the graphite rear axle (which you won't have to upgrade), but the front wheels ride on bronze oilite bushings. When you have the extra "buckage," you can install bearings from Boca*, Dynamite*, or Trinity, but I doubt that you'll see much performance improvement. Instead, you'll find that the proper front-end caster and camber settings you work so hard to determine will be more consistent with bearings in the front wheels than with bushings—especially when the bushings become worn and develop a little slop.

• **Twin shocks or damper tube?** The Evolution 10F comes with the same damper tube as Trinity uses on their popular (and very fast) series of 1/12-scale Revolver cars, instead of the twin side shock absorbers with springs included on the more expensive graphite versions of the Evolution 10. Though the twin shocks allow you to set tweak and side roll precisely, these areas can really frustrate

novice racers. Set up your car incorrectly, and it will wind up steering in one direction more easily than in the other, and that will result in surprising spinouts and lousy lap times.

The damper tube allows the rear pod to "float,"

and this increases rear traction and makes the car consistent in both left- and right-hand turns. New racers need to set their cars up to "push" a little, with more traction out back than in front, and the equipment included with the 10F allows you to accomplish this admirably. When you want more "snap" in left-to-right transitions, replace the damper tube with Trinity's twin shocks. But keep the

Building & Setup Tips



■ The front wheels coast pretty well right out of the box, but you can make them a little smoother if you polish the front axles with Brasso® or Simichrome until they're very shiny, and then use some Paragon® Liquid Bearings on them. I brushed a light coat of it on the front axles, and the wheels now coast a little longer than before.

■ Don't try to mount your receiver with a Stealth-type antenna in front of the battery box. I did so and found myself without enough clearance to put in a battery pack! Follow the instructions, and put the receiver on the right side of the chassis, next to the antenna mount.

■ The directions suggest that you mount the steering servo with double-sided tape, but I opted to use some inexpensive Corally® servo mounts. (I know how hard I can hit the wall!) Trinity offers inexpensive servo mounts as well.

■ I found that the Evolution 10F had gobs of rear traction right out of the box. That's a good thing, because it allows drivers to tune out rear bite a little at a time. It also encourages new drivers to experiment with the front end's caster and camber settings to find out how changes in suspension geometry will affect the car's handling. If you can't get a car to run a normal line right out of the box, you won't be very interested in messing around and trying to go faster.

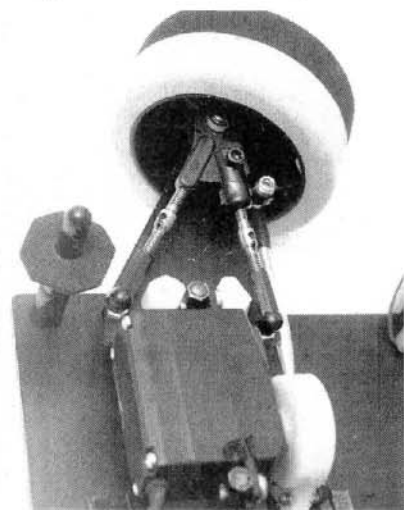
■ Rear traction is easily controlled by varying rear tire compound and rear shock-oil viscosity. Thinner oil and softer tires yield more traction; higher oil viscosity and harder tires yield less traction. Go up in oil weights until the car's rear end breaks loose under power coming out of a tight turn, and then go back one "weight." Then install progressively harder rear tires (green, then blue, white and purple) until the rear end starts to skate under full power down the straights; go back down one level, and you should be in the right place. You may want to borrow tires from your friends to establish your ideal tire compound; tires are expensive!

■ Once the rear end has been taken care of, start to work on the front suspension. The settings recommended in the instructions will get you to this point, but now it's time to tailor the handling to your own driving style. More negative camber (tires leaning in toward the center of the car) typically yields faster corner initiation, called "turn in." Never start with positive camber (tires leaning out); it's usually best to start with a 1/2 degree or so, and move up in 1/2-degree increments until the car becomes darty and uncertain, then go back one setting. It also pays to check how flat your tires are worn after every run, and alter the camber settings so that they wear as evenly as possible. An RPM® camber gauge is an inexpensive tool to help you make accurate settings here.

■ If you have way too much steering—even with no camber at all—use a stiffer front spring; they're easy to change. Want to slow down the steering just a bit? Smear a little Trinity Purple Stuff, diff lube, or heavy shock fluid on the kingpin where it passes through the rubber O-ring to provide some damping action.

■ More caster (kingpins leaning backward) will make the car very stable down long, high-speed straights and will give it more stability when it exits turns, but it may make the car seem lazy or slow entering them. Less caster will give you more entrance steering and speed, but it may make the car darty in the straightaway. The best thing about the Trinity Evolution 10F's Reactive Caster™ suspension design is that you can have the best of both worlds: set the caster so that the car feels comfortable in the fast parts, and when the suspension is compressed in the twisty turns, the caster is reduced. Shazam! Faster steering just when you need it. Neat, eh?

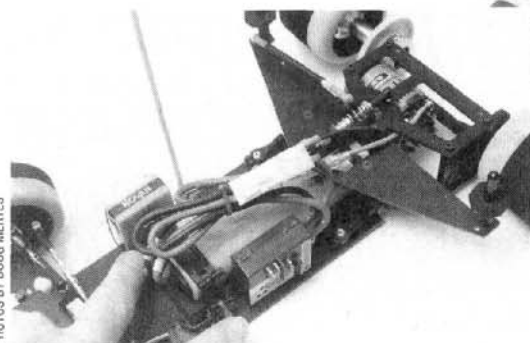
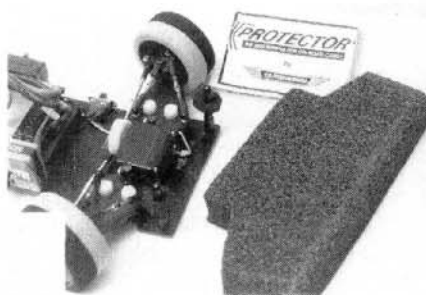
■ You can also tune front traction with tire compounds. Greens, blacks and pinks will give more steering than blues, purples, whites, or some other "natural" or gas rubber compounds. Once again, your friends may be the best source of a recommendation for your particular track, or they may be willing to lend you a set of tires for a couple of hot laps to help you decide.



This Reactive Caster™ front-end design lets you dial in camber, caster, toe-in and toe-out, and it reduces caster as the suspension is compressed. You can set it up to suit your personal driving style.

Right: consider installing a TD* Protector or a similar foam front bumper to protect your body and suspension.

Below: the layout is simple and easy to maintain, but I wish the chassis were a little wider where the receiver and ESC are mounted.



PHOTOS BY DOUG MERITES

damper tube handy; many experienced racers replace the shocks with the tube when a parking-lot surface is extra slippery.

TEST GEAR

This car is likely to appeal to those moving up from spec class racing, so I decided to install electrics comparable to those

ward circuit, but its performance turned out to be in the same league as any of the other entry-level ESCs I've used recently. If you're looking to step up from a mechanical speed control to a decent forward-only electronic unit, consider this one. It uses monster gauge wires and even comes with Tamiya-style battery plug and bullet motor connectors already attached. I found it very easy to set both the neutral and high-speed pots to match my radio.

For motive action, I popped in a new black Matrix motor from Integy Products*. This Epic-based unit is about as strong a stock motor as you can get. Matrix uses a very aggressive high-silver-

THINGS YOU'LL NEED

- 2-channel AM or FM radio transmitter/receiver.
- Relatively high-speed steering servo (any size).
- Electronic speed control.
- Motor and 64-pitch pinion gear.
- Steering servo-saver.
- Battery pack (stick or side-by-side style).



Factory Options

- Front wheel bearings.
- Light, purple-anodized aluminum screw set.
- Light, purple-anodized aluminum hub set.
- Graphite chassis plate, upper and lower pod plate and front-suspension base plate.
- Twin side shock absorbers/tweak adjusters.

stick packs that I felt would be typical of those found in the average racer's pit bag.

PERFORMANCE

I tried out the Evolution 10F on two very different track surfaces: an unprepared asphalt parking lot and an Ozite carpet track used only for racing. I used the same Protoform* Nissan body on both tracks, because my experience with it has shown that it is very versatile. The biggest changes I made were to tire compound, caster and camber settings and rear shock oil. The tires that came with the kit (BSR* spec-style tires and rims mounted with green foam on the rear and blue foam up front) performed reasonably well on the carpet using the settings recommended by the instructions. That's good, because if the car handles OK out of the box when you first put it on the track, you'll feel more confident about trying some alternative setups.

I prefer Jaco* tires and rims because of their consistency from set to set, as well as for the stiffness of their rims. That's why so many of the top racers run with them. Ultimately, I found that the fastest lap times on the carpet came from using Jaco's purple fronts and blue rears, 40WT Trinity silicone shock fluid, 2 degrees of caster and 1/2 degree of camber. Set up this way, the car would glide into even the tightest turns without sliding out, yet it maintained speed through the corner thanks to

THE COMPETITION	PTI SSE	Associated RC10L Fiberglass	Trinity EV10F	Bolink Supersport
Wheelbase	10.3 in.	10.25 in.	9.85 in.	10.2 in.
Width	7.3 in. (F)/7.8 in. (R)	9.25 in.	8.3 in. (F)/9.0 (R)	8.8 in.
Weight	2 lb., 11 oz.	2 lb., 12 oz.	2 lb., 12 oz.	2 lb., 14 oz.
Diff type	Ball	Ball	Ball	Ball
Chassis	Fiberglass	Fiberglass	Fiberglass	Fiberglass
List price	\$235.99	\$170	\$199	\$139.95
Available at*	\$145.99	\$102.99	\$129.99	\$74.99
Reviewed in	TC	TC	8/96	TC

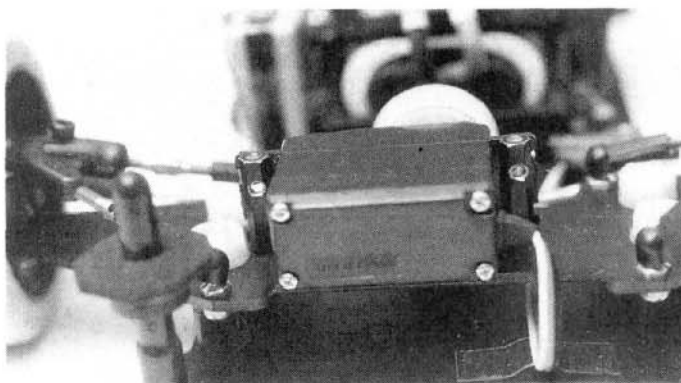
*Prices vary with location.

found in the average spec car. Novak's* lovely Polaris AM receiver catches the signals sent by my vintage '80s Futaba* Magnum Junior transmitter. It does an excellent job of screening out unwanted interference, as well as rejecting the scattered signals that are caused by chain-link fences and large vans in parking lots.

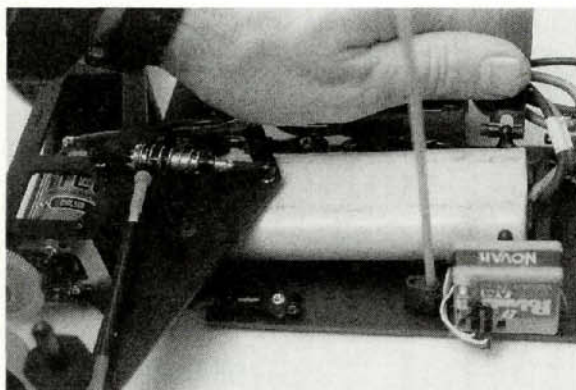
For steering duties, I used Futaba's venerable S132H servo, which is available for under \$35 in most places; it's the typical racer's first step up from the slower, larger and heavier S148 servo that's in entry-level Futaba radio setups.

For an ESC, I used one of M.Troniks* new Monster FET speed controls. I was somewhat skeptical when I first saw it, because it appears to have only two FETs used in the for-

content brush, which yields high rpm and power numbers, so I figured that it would effectively test the limits of the chassis and electronics. I combined this great motor with some unmatched 1400SCR



I used some inexpensive Corally* servo mounts to make sure the Futaba S132H stays where it's supposed to—even when I hit the wall. Trinity also offers inexpensive servo mounts as a hop-up option for the EV10F.



Easy in, easy out. The motor pod and battery box were designed to allow equipment to be installed and removed easily between heats.

the Reactive Caster™ suspension design that reduces caster as the front suspension is compressed. Fast in, fast out and, thanks to the Matrix motor, fast down the straights as well.

On the parking lot, I once again found that the kit tires did an acceptable job, but my lap times improved when I changed to Jaco's pink fronts and rears. If that's too much steering for you, try purple fronts instead. Drop the rear shock fluid to 20 or 30WT, keep the 1/2 degree of camber, and increase caster until you're

happy with the way the car comes out of the turns (I wound up with about 4 degrees). I found the 10F to be a very stable and forgiving performance platform on the parking lot; it's a huge improvement over what we had to contend with six or seven years ago when I first started racing pan cars. This chassis is easy to drive, and that means owners will be able to spend their time practicing rather than becoming frustrated trying to get the car to stick to the pavement.

FINAL THOUGHTS

This is a car you can win with. It's certainly a car you can take to the A-Main at your average local or regional carpet or parking-lot event. The Evolution 10F does all the right things: it uses standard 1/10-scale pan car wheels and tires; it's easy to tune; it handles well right out of the box; and it doesn't require a host of aftermarket parts to be competitive. You'll have to spend a little time deciding on front-end adjustments, but that's no big deal. Lots of bod-



LIKES

- Strong, stable handling.
- Easy to assemble and tune.
- Fully adjustable front suspension.
- Handles well right out of the box.



DISLIKES

- Chassis plate needs to be a bit wider where the receiver and ESC are mounted.
- Entry-level drivers need front bumpers.

ies will fit, including Trans Am, Group C, ASA, World Sports Car (WSC), wide sedans, etc., so no matter which kind of on-road class your local club runs, you'll be able to participate in the fun. Don't be put off by the fact that the car comes equipped with bushings and fiberglass. Trust me; by the time you learn how to drive well enough to really get some benefit from graphite parts, you'll have saved enough money and put in enough track time to really beat those go-fast guys!

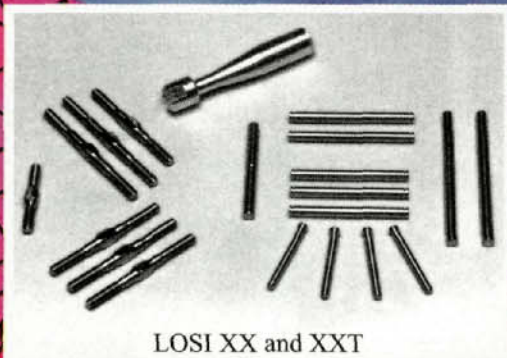
* Addresses are listed alphabetically in the Index of Manufacturers on page 166. ■

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PHOTOS BY WALTER SIDAS

"Top of the world, Ma!" Doogie proclaims that he's king of the rally hill.

go-anywhere capability of an off-road buggy: we'd make our own rally cars out of some 2WD buggies that were lying around. I bet that a lot of you have an old RC10 or Ultima stashed under your bed or in the dark recesses of your closet. Making a rally car is the perfect project to give that buggy a new lease on life!

Another part of our idea was to make the conversion from buggy to rally car as painless as possible; we didn't narrow the cars or greatly re-work their suspensions. In fact, the conversion consists of little more than

GOT AN OLD BUGGY THAT'S

REALLY ENJOY getting together with the other editors to race our touring cars. As is to be expected, there's always a lot of door-bangin', and I frequently find myself hammered off-course and onto the dirt and grass that border the track. Now, your typical touring car just doesn't have a great deal of ground clearance and can seldom free itself from even the shortest grass; this means that I'm always running across the track to free my little pavement bug from its botanical trap. We needed vehicles that would handle the real-world conditions of our local parking lots—asphalt, sand, gravel and grass.

During a late-night nachos-and-Häagen-Dazs session with senior editor Chris Chianelli, the solution to this dilemma came in the form of a dim, 15W light bulb over Chris's head.

We decided to combine our love of touring cars with the

YOU DON'T HAVE TO BUY A NEW CAR;

Let's go rally

YOU DON'T HAVE

changing tires and mounting a full-fender rally-car body. Part of the appeal of this conversion is that it will work with just about any 1/10-scale off-road buggy. So although that old RC10, JRX-Pro or Kyosho Ultima may not be competitive against today's generation of buggies, it's the perfect candidate for rally conversion. Drag 'em out and clear a space on your workbench, because it's really rally time!

by Frank Masi

WHAT IS RALLY RACING?

The World Rally Championship is one of the world's most hotly contested series. Across the planet, top manufacturers and highly paid, full-time race drivers contest titles for manufacturers and drivers in exotic and challenging conditions.

Rallying consists of a number of classes from near stock cars in two-wheel drive to top-of-the-line, full-time, four-wheel-drive turbo machines used by the top teams. The cars are based on production vehicles but have been massively re-worked: suspension, engines, drive systems and overall weight are improved to make the cars super responsive and fast, yet amazingly tough.

Rallies take place everywhere—from Australia to England, Kenya to Sweden—so the championship has a global image that captures the highest sporting attendance figures in many countries, including the UK. The varied conditions—everything from sub-zero temperatures, wind rain and snow, to baking hot desert courses—dictate that the teams build special cars for every event. The races'



COLLECTING DUST? WANNA HAVE SOME FUN?



TO DRIVE MILES IN SEARCH OF A TRACK.

AND HERE'S THE BEST PART:

YOU ALREADY HAVE MOST OF WHAT YOU NEED.

Racing!

gruelling schedules, which include up to 20 hours of racing over a number of days, added to the fact that the cars are driven to the beginning of each race stage, mean that reliability and speed count heavily.

Every car has a driver and a co-driver who communicate via an intercom; they shout messages while driving. Top drivers include Carlos Sainz from Spain and Colin McRae, the reigning world champion, who drives for Subaru. Both are backed up by a massive team comprising mechanics, mobile workshops and often helicopters that follow the cars to the next stage and are ready to do

repair work.

With masses of power under the hoods and the world's top off-road drivers, the World Rally Championship produces fantastic racing in amazing conditions. In Africa, cars dash across the Kenyan plains avoiding rhino while exceeding 140mph on a dirt road. This is exciting beyond imagination and it confirms why the world's top auto makers consider competing "a must."

WHERE THEY RUN

No tracks are used for the World Rally Championship: drivers follow a prescribed course over rough terrain. Drivers and co-drivers are given a map of the course, and they race "blind," without knowing precisely what lies ahead; this means the course is the same for everybody.

WHEN THEY RUN

The event takes place over eight months on four continents, and drivers don't stop at nightfall! This adds to the excitement—racing in the dark!



HOW TO WATCH

Rally crowds suffer the cold, the rain and even the desert sun to watch their sport. The crowds are often dangerously close to the action, and spectator injuries are frequent.

THE CARS

Often turbocharged and with four-wheel drive, semiautomatic gearboxes and masses of suspension travel, the cars have the durability that allows them to be raced flat out for hours on end. Top manufacturers, such as Ford, Subaru, Renault, Mitsubishi and Toyota, all have works teams.

—by Alan Harman



The Renault Clio 2L Williams—winner of the 1994 Monte Carlo WRC in the 2-liter class; 13th overall.

How we built 'em

Frank's RC10 Celica

The foundation of my rally car was my trusty Associated* RC10 Worlds Car. I was excited about the new B2 coming out, but until this project, I feared that my old "tub" car would never again see the light of day. I'm a big Sega Rally fan, and my favorite car to play is the Castrol Toyota Celica. This is the one that I chose to duplicate using Parma's* Celica GT body.



The Celica rally car has an RC10 chassis with Pro-Line Rally Hawg tires and a Parma body. Tamiya decals and silver-painted wheels add to its realistic look.

First, I needed to figure out a way to mount the body. After much searching, I came across an item from RPM* that was perfect; their no. 7013 Front Oval Bumper-Body Support. This large, white-nylon front bumper was designed as a direct bolt-on for the RC10, and it also

has provisions for attaching body-mounting posts. I bolted a pair of DuraTrax* 2-inch-long body posts to the RPM bumper. Then I attached two, 4-inch-long posts to the RC10's rear bulkhead by threading a 1/2-inch-long, 4-40 steel screw into each post and then cutting the screws' heads off using a pair of wire cutters. After lightly filing the screws' cut ends, I threaded the posts into the outermost holes on the bulkhead (the holes to the outside of the wing-tube holes).

Whenever you mount a body that isn't intended for a specific brand of car, i.e., the body doesn't have pre-drilled or dimpled pilot holes to accommodate the body posts, I recommend that you make the body-post holes before you mask and paint the body; it's just easier this way.

Painting the Parma Celica body was very easy because it's large. After applying masking tape to all the windows, I masked the front grill area and the rear taillight panel (which would be painted black after I had sprayed the entire body with Pactra's* Sprint White). I know that you're supposed to apply the darker colors first, but this seldom makes sense when the darker areas are very small. Besides, white paint really doesn't allow the darker colors to show through, but to be sure, I



applied a light coat of Pactra Indy Silver to back up the white and ensure that the black paint wouldn't bleed through.

Tamiya's* Castrol Celica GT decal set had all the cool, green-and-red "swooshes" that make the real car so swank. It was a challenge, however, to fit many of these graphics on the big Parma body, because they were made for the much smaller Tamiya TAO1 chassis. I used a hair-dryer to heat some of the larger decals and make them conform to the body's compound curves. The results of all this work, however, made it all well worth it. I think the finished body looks just like the Sega Rally car.

The rally conversion is very simple, yet when we drove the cars, we felt as if we were testing some wild new prototypes.

Doog's Rally-X Escort

Let's face facts, folks; my rally car is the coolest, and it's the best! It has the best-looking body, and I used one of the most current, and winning, off-road buggies as a platform. How could I lose? My "Rally-X" is based on my race-ready Team Losi* Double-X. I initially tricked it out with a ton of go-fast goodies to help it withstand the rigors of off-road racing—parts such as Losi's lightweight graphite components (chassis and front brace, rear shock tower and suspension arms), an aluminum top shaft, a Hydra Drive, a lightweight polished motor plate, aluminum drive shafts, Lunsford* titanium turnbuckles and hinge pins, and a fast, yet "torquey," JR* 4735 steering servo. My radio gear consists of a Tekin* G-12c and a



The Escort rally car is based on Losi's state-of-the-art Double-X buggy chassis. Pro-Line tires mounted on Losi's awesome five-spoke wheels make by far the best wheel/tire combo of the bunch.

Novak NER-3FM receiver, while a Trinity Buggyweld modified motor and a Trinity battery pack provide the go power. Controlling my sideways-slidin' rally rig is

my trusty Airtronics* Caliber 3Ps. Rounding out the package is a full set of Team Losi's five-spoke wheels clad with Pro-Line* Rally Hawgs. The five-spoke wheels help give my buggy that extra "rally-racing ready" look!

Painting and assembling the body proved to be the most time-consuming step of my buggy-to-rally-car conversion. (Yes, assembling; my Ford Cosworth body was the only one of the three that came with separate molded front and rear bumpers and a separate high-tech-look rear wing.) I wanted to take my time and make sure it looked just right. I sprayed the front with Pactra Racing Blue and the rear with Pactra Daytona Yellow, and I backed it all up with Pactra's Sprint White. As an added touch, I detailed the outside of the body with Trinity's Ex-Spec Pen (let me tell you, that thing is awesome!).

I also received a care package from

George's TCP Mondeo

After a lot of debating, I decided to convert my Traxxas* TCP buggy into a rally car. I was a little reluctant at first, because I've put so much time, effort—and, yes, money—into this awesome buggy that I did not want to subject it to the hack festival we call racing.

After I had installed a complete set of Pro-Line Rally Hawgs, I realized that I had already halfway finished the conversion. The next step was to install the body mounts. In the rear, Parma universal body mounts fit perfectly in the holes on the rear bulkhead where the wing-mount tubes go.

Up front, I originally installed a set of DuraTrax universal body mounts on the graphite upper deck, but I soon realized that this left the front of the body unsupported, and it was very flimsy. I decided to follow Frank's lead and install an RPM Front Oval Bumper-Body Support. I did have to modify the bumper slightly to fit my TCP, but that was an easy task thanks to my Dremel!

Next came painting and mounting the



body. I chose a Parma Ford Mondeo body because it's big and will give me a serious hacking advantage. (If you've ever seen us race against one another, you'd understand why I chose the big Mondeo body; we're absolutely brutal!) I decided to paint my body red, green and yellow with Pactra spray paints, and I decorated it with various Parma, Tamiya and Trinity decals.

After I had mounted the body, I noticed that the front wheels stuck way out of it. No problemo. I installed the short front suspension arms that were also included with my TCP kit. That did the trick, folks: the wheels were tucked away under the wheel wells. Overall, I was very surprised at how easy it was to convert the buggy into a rally car, and the finished product turned out really cool. Frank...Doog: you're going down!

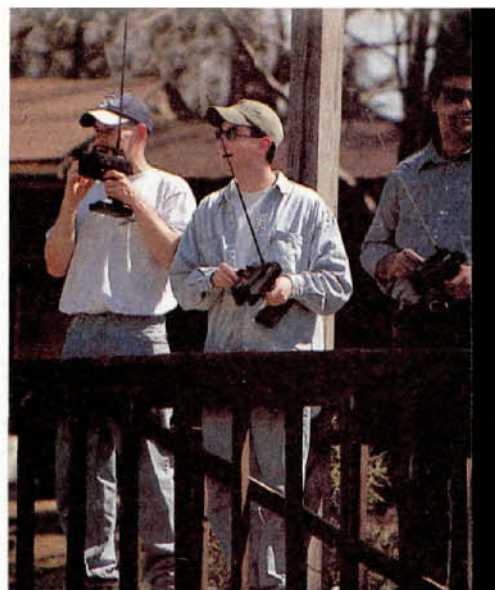


The Mondeo was finished in a creative "NASCAR/rally" motif. Traxxas TCP racing buggy chassis, Rally Hawg tires and custom window netting rounds out George's interesting project.



RPM, and that helped the conversion along rather nicely. Inside the box, I found a front bumper and several shock limiters to limit both up-travel and down-travel. The way the bodies are designed (remember, you now have wheel wells to contend with!), you really do have to limit your car's suspension travel—especially the front travel; the rear suspension travels only up and down—not up; down and back like the front does. If you don't limit your front shocks' up-travel, they'll be compressed right into the body—obviously, not a good thing.

On the front of the RPM bumper, I mounted a set of DuraTrax body posts, and I used Lunsford titanium turnbuckles, screwed another set of body mounts into them and mounted them in the back near the shock tower. Just pop the body on and voilà!—instant "Rally-X." Looks sweet doesn't it. Now it's time to kick some butt.



The BMX Judges's tower provides us with a good view of our makeshift rally track.

Rally cars are intended to run well on almost any surface—dirt, grass and pavement.



All three rally cars relied on power provided by Trinity's

potent Buggyweld 13-turn double, machine-wound mod motors. The Buggyweld has ball bearings and adjustable timing, and it comes with good brushes and springs. The power supplied was more than enough to propel our rally cars to dazzling speeds.



Rally Car Shopping List

✓ Bodies.

We needed bodies that were wide enough to cover a typical off-road buggy's chassis and wheels. Parma's catalogue had exactly what we were looking for. Their Toyota Celica GT (part no. 10374) and Ford Escort RS (10377) rally bodies were perfect; we also chose Parma's Ford Mondeo body (10389), which lends itself better to a touring-car application, but which, with the right tires and slight body "lift," will make a convincing rally car.

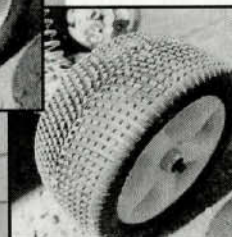


✓ Decals.

Early on, we realized that no one makes decal sets for rally cars of this size, so we turned to those masters of scale realism at Tamiya and procured decal sets for their Castrol Celica and Michelin Ford Escort rally cars. Parma also supplied its no. 10738 Rallycross and 10737 Euro Sponsors decal sets. The Tamiya decals are much smaller in scale than the bodies, but we were confident that, with the right paint job, if creatively applied, the decals would make our creations look authentic.

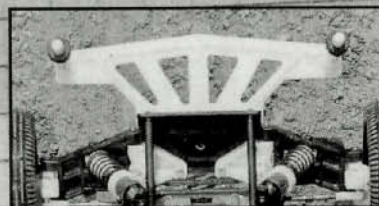
✓ Tires.

Pro-Line makes tires appropriately called "Rally Hawgs," and we chose them for all three cars: narrow up front and standard, wide tires in the rear. Originally designed for the Yatabe Arena Worlds track in Japan, they have hundreds of tiny, square treads that provide exceptional bite on pavement and other hard surfaces. Plus, they fit all popular 2.15- to 2.2-inch-diameter wheels, and they actually improve with wear!



✓ Bumper/body mounts.

To mount the bodies and to ward off evil competitors, we used RPM's molded front bumper/body mount. It was designed to be bolted right on to the RC10, but with a little "coaxing," it can be very versatile. We also use RPM's up-travel limiters for Traxxas, Losi and Associated shocks. They're little clip-on spacers that prevent the suspension from allowing the chassis—and body—to bottom out on the ground.



Going Racing? Ready to WIN? You are— If you've got the "RIGHT STUFF!"

THROTTLE CONTROL, A COOL HEAD, NERVES OF STEEL & THE RIGHT PERFORMANCE PARTS

In search of speed secrets, "cause winning is more FUN!

NEWS scoop
by David Lane

NEW 4 RC/10

Front & Rear Oval - Road Shock Towers

PT# 2095 Front & PT# 2096 Rear



1995 BTCC VOLVO 850 SEDAN BODY - Clear Lexan PT# 7367
"THE BEAST IS OUT"
Grill, Lights & Emblem Stickers included



Grill, Lights & Emblem Stickers now included with body
PT# 7368 ESTATE Clear Body
And PT#7371 1994 BTCC
Sticker Sheet sold Separately

NEW 4 RC/10 B2 FRONT SHOCK TOWERS
Cut out of 1/8" black Fiberglass



WHY TWO & SO MANY HOLES?
So you can change shock angle without changing ride height, & Because all tracks ARE NOT CREATED EQUAL!

FOR Yokomo YR-4's



Front PT# 2030
Rear PT# 2031
Cut from 1/8" Black Fiberglass
PT# 2030 Front Tower
PT# 6195 B/B Steering for Fiberglass chassis & the "M" chassis
PT# 6190 Hex Wheel Adapters - precision machined to a perfect fit for Yokomo Axles
PT# 6195 Spur Gear Adapter, NO ONEWAY or quicker acceleration & four wheel braking.
Shock Towers & Bumper fit all KITS
PT# 2031 Rear Tower
PT# 6186 B/B Steering for Graphite chassis
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Rallycross Anyone?

When we put our freshly completed rally cars on the track for the first time, we didn't know what to expect. We had staked out a makeshift course at a local BMX track (Bethel Supercross in Bethel, CT), and it was ideal because it offered a variety of surfaces that were perfect for rally racing.

On one end of our course, there was a large, paved, banked turn, and there were two dirt straights—a "front" one with a large, BMX-size tabletop jump, and a "back" straight with a killer set of triple jumps. We then outlined part of the track's grassy infield with overturned plastic plates to serve as a "bridge" between the front and rear straights. This layout formed a challenging, circular course. We commandeered a nearby judges' tower to serve as a drivers' stand.

The performances of our conversions far exceeded our expectations. On my first attempt, I banged the tabletop, then landed perfectly on its back side, so I knew this would be fun—especially with George and Doogie on the track.

Everything worked! The big rally bodies didn't scrape the ground nearly as badly as I had predicted (even after landing off big jumps), and the Pro-Line Rally Hawgs were totally hooked up on the sandy dirt and on the grass and pavement. The cars' jumping was awesome! George got the most air time, while Doogie and I drove more conservatively. It just goes to show that a simple twist on a familiar chassis can provide big-time fun. The rally conversion is very simple, yet when we drove the cars, we felt as if we were testing some wild new prototypes.

**Addresses are listed alphabetically in the Index of Manufacturers on page 166.*



Clockwise from top left: ■ Rally cars tend to attract crowds of baseball-hat-wearing teens. "Conform...conform...." ■ C'mon George! Fix the damn thing and get back on the drivers' stand! ■ Our makeshift rallycross track combines pavement, dirt and grass—plus enough jumps to get serious air time. ■ One obstacle on the whole track. One! King of the hill himself parks his Escort without his valet ticket! ■ George "skies" his Traxas-based Mondeo rally car over a drop-off jump. The man knows only "full throttle!" Stay out of his way! ■ Doogie demonstrates the proper way to ventilate a tire.

Rally Car Setup Hints

Rally cars are intended to run well on almost any surface—dirt, grass and pavement. Set up your chassis to provide the best overall handling. Here are some setup tips:

- **Use stiff springs** This helps performance on pavement, because chassis roll is limited, and response during cornering is sharp. For example, I used Associated's Blue truck springs on the rear of my RC10 and Green springs up front.
- **Use shock pistons that have small holes.** Doing this increases the shock's "pack," i.e., it limits how quickly the shock can absorb very harsh or "quick" suspension movement. Using small-hole pistons along with stiffer springs will greatly enhance high-speed handling and responsiveness.
- **Mount a front and/or a rear swaybar**, if one is available for your chassis. This will improve high-speed handling, stability and cornering and will minimize chassis roll when cornering. If no company makes a swaybar kit for your chassis, experiment by

making your own out of music wire (available in a variety of thicknesses at most hobby shops).

- **Limit shock travel.** With our rally cars, we didn't have to limit the shock's down-travel (which controls how far the shock extends downward). We did, however, limit up-travel on the front shocks to prevent the front suspension from being compressed too far and allowing the front of the body to dig in. This helps the cars to jump better and to go over bumps.
- **Use less caster**, especially if your rally course consists mostly of smooth, hard surfaces such as asphalt. George, Doogie and I each use 25-degree caster blocks on our rally cars. This keeps more of the front tires in contact with the ground when stiff springs, low ride height and swaybars are used to limit chassis roll.

TURN MARSH

by Derek Buono

MANY ARTICLES have been published on how to set up and drive a car. It is these fundamental

The right way to get cars back on track

parts of the hobby that we envision when we race. Drivers maneuver within inches of one another to show off their skills behind the wheel. There is another side of racing that is often overlooked: turn marshalling—a skill that doesn't come naturally to drivers. With all the attention given to driving, it's no wonder that some people need lessons on how to turn marshal properly. Get out your pen and paper; school is now in session.

Turn Marshalling 101

"Marshal!" How many times have you been on the receiving end of that cry? How many times have you screamed and hollered at a marshal because he couldn't run the 40 in under 5 seconds? I'm not defending all marshals, because some are definitely not up for the turn-marshal-of-the-year award, but sometimes they aren't to blame (think about it; who got your car into that position to begin with?).

Some people have a legitimate excuse for not marshalling. (Some have medical reasons or physical disadvantages that limit their abilities as a turn marshal.) If you fall into this category there are two alternatives: find a capable person—another driver preferably—to substitute for you, or find a section of the track that has a low incidence of crashes. Avoid places with a lot of obstacles or tricky turns, and look for a spot at the end of a straight. If someone has taken the spot you would like, ask him politely to relocate. If you don't fall into this category, there is absolutely no excuse for you not to marshal when it's your turn.

Here are some steps to follow for marshalling a stranded vehicle:

① Try to marshal the vehicle as you would want your car to be marshalled.

② At the time of the accident it's important that you **don't cause more of a problem than there already is**. After checking for any oncoming traffic, approach the car with authority. It is not going to bite, so don't be afraid. **Avoid taking to the air like Michael Jordan** to get to the vehicle; only do this as a last resort. You may look cool, but if you land on someone else's car there's a good chance you'll ruin someone's day (and car). Also, don't try to get

the car back on all fours too quickly, because it won't look good if you flip the car and force it to do a "Triple Lindy" right back on its lid.

③ Once you've reached the victim, handle it firmly; don't wedge your fingers into any moving parts or grab hot mufflers. **Grab the car in an area that's easy to handle**. Avoid the tires because they spin (duh!), and they may pose a problem when you try to place the vehicle on its wheels. **A good place to grab is the front end or the bumper**, if the car has one. Do not use the body or the wing as a handle because they were not designed for this purpose.

④ It's important to **place the car on its wheels**. **Remember, it usually has four**, so try to place it on all four. Also, don't give anybody an unfair advantage by launching the car down the track. If the car fires off the track, retrieve it, and place it back where it came off. Do not throw the car into traffic or place it at an awkward angle to the track. **Position the car so that it can regain control**, and continue on with the race.

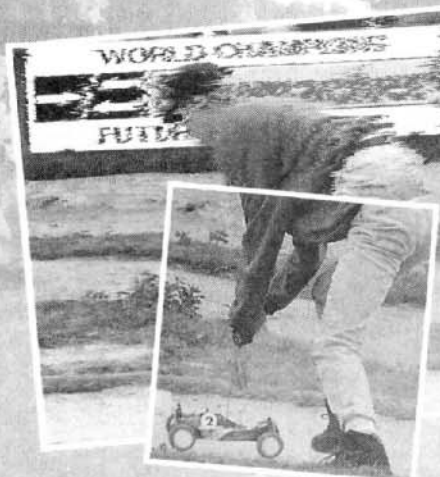


ALLing TechNique

⊙ In the event of multiple crashes, **marshal the car that crashed first and so on.** If two cars tangle and there is no obvious hacking going on, place them so that they have an equal advantage. **Let the drivers decide the race, not the marshals.**

⊙ After you've finished marshalling the vehicle, your job is not finished. **If you can't return to your position immediately, move so you aren't in the driver's field of vision.** When it's safe to return, move back to your spot. Depending on the racing class, cars may be approaching at speeds of more than 70mph, and you don't want a car slamming into your ankle at that speed.

⊙ It's important to **watch the area assigned to you** and not the race. We all love to watch a great battle for the lead, but there may be other battles going on, and if they're not for the lead, it may be for bragging rights. **You are out there to do a job; you're not there to watch the race.**



⊙ There is **no eating, drinking, or smoking** while marshalling.

⊙ Now, there's no such thing as a perfect marshal, so **if you make a mistake, try to apologize to the driver after the race.** This professional approach will help reduce stress.

There is also a proper way to behave on the drivers' stand:

⊙ Remember, **you crashed**; if the marshal who helped you had not been there, your race would have been finished! If there was a mishap in marshalling your car, stay calm, and give the marshal a little slack. Plus, if you're mad at the marshal, how are you going to concentrate on the rest of your race? **Concentrate, Grasshopper.**

⊙ When the marshal approaches your car, **stay off the throttle.** It is the turn marshal's right not to fix your car until you decide to give him a safe approach. Also, **run with your gear cover**; it doesn't matter if you don't care about your gears; usually, **people care about their fingers.**

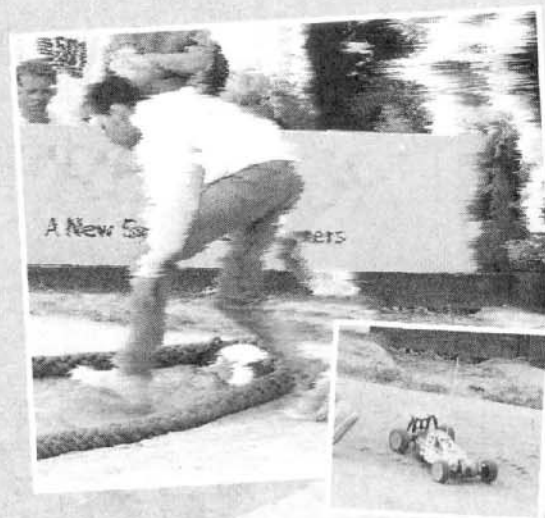
⊙ **Don't get on the throttle until you hit the ground.** Not only are you risking the possibility of breaking something, but you are also running the risk of further delays.



⊙ Some people say that these are only toys and you shouldn't take things so seriously, but I understand that it's racing, and racing is very competitive. **In the event that you lose your cool and vent your frustration on some poor marshal, be a good sport and apologize after your race;** once again, we're going back to my original point; he didn't put your car there in the first place!

⊙ Finally, **if you find yourself crying at the marshals all day,** maybe it's time to lease some advertising on the bottom of your chassis, and **quit your sniveling!**

Following these simple steps will show that you are a true professional. You will gain the respect of fellow racers, and you'll make the day a more pleasurable experience.

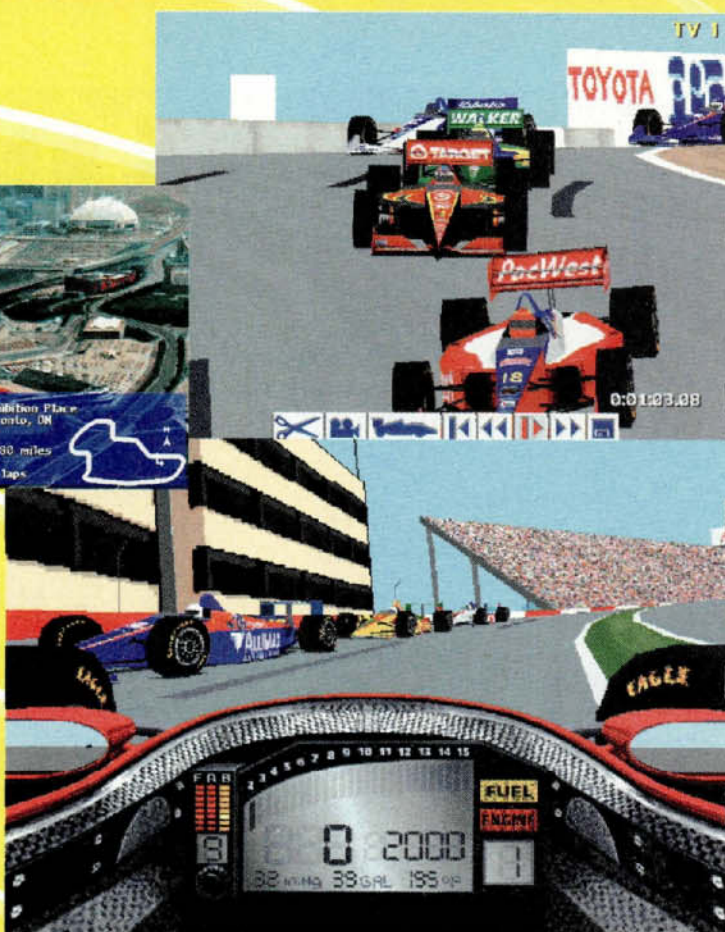




Serpent Virtual R/C Game Port Adapter

by John Howell

THERE ARE two hobbies I absolutely love: driving R/C cars and playing video games. If I'm not out racing my off-road cars or running touring cars with Frank and George, I'm probably kicking back at home playing SEGA RALLY or DAYTONA USA on my Sega Saturn, or RIDGE RACER or ROAD & TRACK'S THE NEED FOR SPEED on my Sony PlayStation. You can see that I love driving cars of all kinds: R/C, full-size (especially rental cars!) and even 2-D video-game cars. So, when Serpent's* Virtual R/C Game Port Adapter (VRC-1) came sliding across my desk, I was pretty psyched.



**RIGHT FRONT
RIGHT REAR
LEFT REAR
LEFT FRONT
STAGGER
DONE**



	Soft	0	150
Cold	36psi	M	150
Hot	41psi	I	150

Screenshots
from
**INDYCAR
RACING II**
by Papyrus.

For those of you who aren't familiar with this product, the VRC-1 replaces your PC's keyboard or joystick controls and allows you to use your R/C transmitter (stick and wheel radios both work) to control your favorite PC racing game using the latest digital/analog technology. By hooking up the VRC-1, I could combine two of my favorite pastimes into one session. Now all I had to do was find a PC; we here at *Car Action* work on Macs.

HEY, GUYS, CAN I BORROW YOUR PC?

Luckily for me, our company recently acquired a new PC gaming magazine, *Computer Player*, and its editorial office is right down the hall from ours. I spoke with senior editor Jeff James and associate editor Glenn Broderick about letting me test the VRC-1 on one of their PCs, and they gladly obliged. They set me up with a Dell Dimension XPS PC, which has 16 megs of RAM and a Pentium 120 processor. The game I tested with is as hot as the computer itself—*IndyCar Racing II* by Papyrus.

Setting up the VRC-1 is as user-friendly as can be. Glenn helped me load the software into the PC while I set up the VRC-1 unit. First, I plugged the VRC-1 into the computer's joystick port, then I plugged the throttle and steering leads into my Novak* NER-3FM receiver. My radio of choice for this test was my trusty Airtronics* Caliber 3Ps. I set all my trims and settings to relatively neutral positions and turned on the game.

Before gameplay begins, one of the first screens tells you to calibrate the joystick—or, in this case, my radio—to the game. I turned the wheel to the left and right, and then I squeezed the trigger and applied the brake. It kind of reminded me of setting up an ESC that features a one-touch, push-button-style setup. With that done, it was time to fire up a practice session with my "R/C powered" Indycar.

"What an excellent invention!" I thought to myself. I was so psyched up to drive this car using my radio that I nailed the throttle and...*crunch!* I smashed right into the front of the car directly behind me. Unfortunately, when I nailed the trigger, I had gone backward instead of forward, and I think I smeared "Little Al's" car all over the racetrack—oh, well! So I pushed the trigger forward to go into reverse to see whether the car would go forward, but it didn't! And not only that, but the steering was also reversed! I dou-

ble-checked my connections on the VRC-1, and then I reversed the steering and throttle settings on my radio to see whether that would remedy the situation—no go. I bumped up the throttle EPA and steering curve and tried it again—still no go. Help!

While Glenn and I fiddled with the computer, Frank ran into the *Car Action* office to call Serpent USA's headquarters in Florida for some tech support. He got a few setup tips from Serpent gas racer Art Carbonell, so we attacked it again. This time we figured out that we had to go into the menu under "Controls" and re-calibrate the radio to the game there. Once we did that, it worked perfectly.

Soon I was up and racing my Indycar

end of my car from coming around and spinning out. The car was also steering very quickly, so I decided to mess around with the radio settings a bit (an option that most controllers and joysticks don't offer). I turned down the steering speed and altered the throttle curve so it wasn't so punchy right off the line. Once I did that, I dropped almost 15 seconds off my lap times! Then I messed around with the steering throw a little to make turning tighter; that subtle mod shaved off an additional 2 to 3 seconds. Now I was ready for some competition; it was time to start qualifying! I picked the Australian track and got set to hack some other

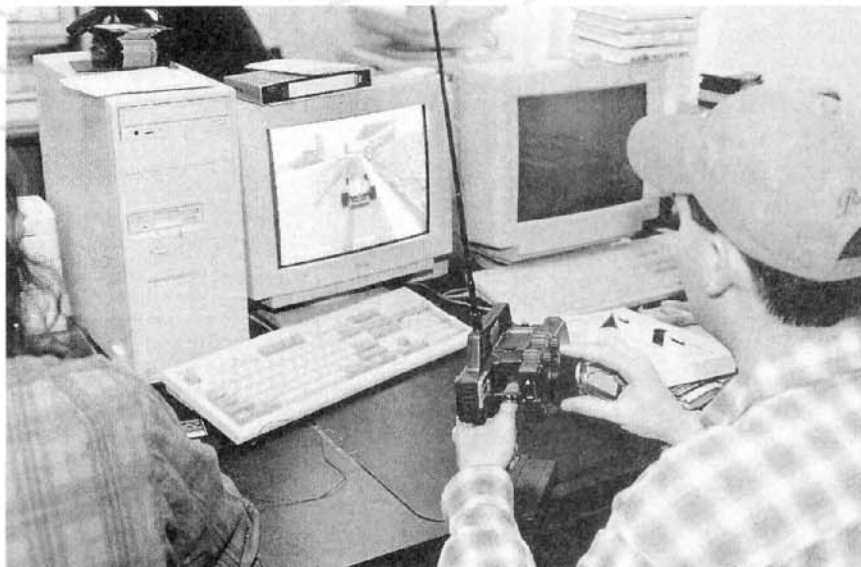
Indy drivers into the walls.

The first lap was tricky, but I had the game set up so that no matter what—or who—I hit, I wouldn't damage my car. (I wish I could use that setting in my real

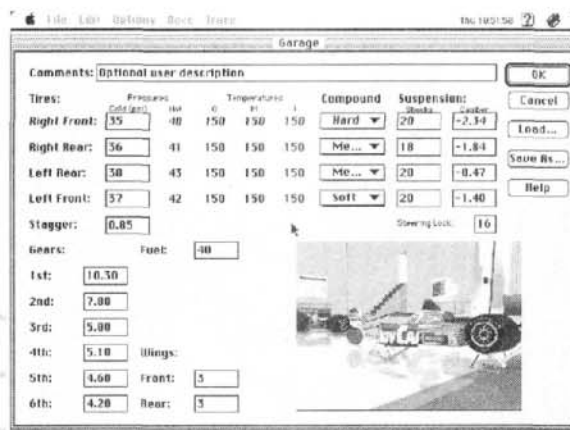
(Continued on page 96)

Control Any Popular PC Driving Game using your R/C Transmitter

without touching the keyboard—or a joystick—and let me tell you, it was a really cool experience! To get used to driving the car with my radio, I first ran a solo practice session. I ran a few laps, and in a few corners, I had to seriously slow down to make the turn and to prevent the rear



Driving without touching the computer keyboard or a joystick was definitely an interesting experience. It felt very close to actually racing an R/C car!



(Continued from page 93)

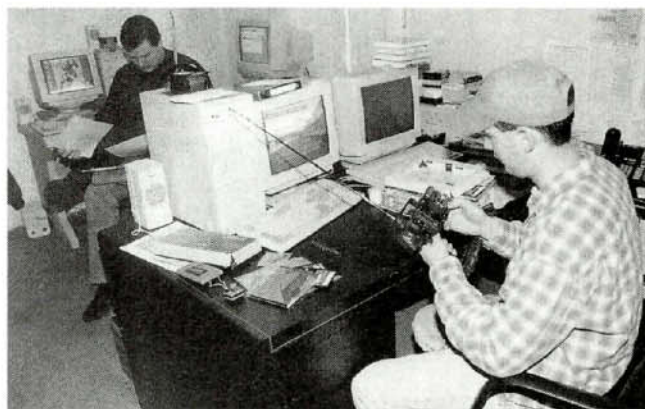
car!) I was having a pretty tough time in qualifying: banging into cars left and right was a little frustrating, but after a while, I didn't mind so much; I was having too much fun! As a matter of fact, the *Computer Player* guys were standing next to me shouting, "Hit 'im, hit 'im again!" What can I say? I got so carried away that I started driving backward on the track—something you could never get away with at your local R/C track. And come to think of it, the other Indycar drivers didn't even yell at me when I hacked them to death! Pretty cool, huh?—total carnage!

I found myself entering the race dead last, but I vowed I would either finish at least mid-pack, or have fun taking out half the field; I stuck with option "B." It's just too much fun coming into a corner too hot and zeroing in on the back of Emmo's or Little Al's car, then watching him spin out and smash into the wall as you drive away unscathed! Using that tactic, I did manage to finish mid-pack, but only because the track was littered with at least half of the pack who suffered my "crash 'n' burn" driving style. I didn't win, but hey, I had fun and that's all that really matters, right?

IS IT WORTH IT?

The big question is: should you buy this product? If you have a PC and you like driving games, then I say, "Yes, definitely!" Here's why:

- I had a total blast using my radio for control; it definitely puts a whole new twist on driving games.
- It's very easy to install. We had the VRC-1 up and running in a matter of minutes. Aside from the initial glitches, the unit worked flawlessly.
- If you really want to race R/C, but for some reason, you can't get to the track—bad weather or you're missing a part that's on order—this is an awesome alternative. Interestingly enough, I got just as excited using the VRC-1 and my radio as I would on a drivers' stand racing R/C cars with my buddies.
- Do you have friends who are into PC games who haven't yet experienced R/C cars? Well, maybe this is the way to entice



Once the software and *INDYCAR RACING II* were up and running, I had to calibrate my radio to the game.

them into the wonderful world of R/C!

Serpent's objective for the VRC-1 was to bridge the gap between radio control and personal computers; they've accomplished this goal nicely. The VRC-1 allows you to have fun with your PC, and it inevitably helps you to learn more about car setups and driving techniques—knowhow that can easily be transferred to the R/C hobby.

*Addresses are listed alphabetically in the Index of Manufacturers on page 166.

TURBOTHIRTY

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TURBOTHIRTY

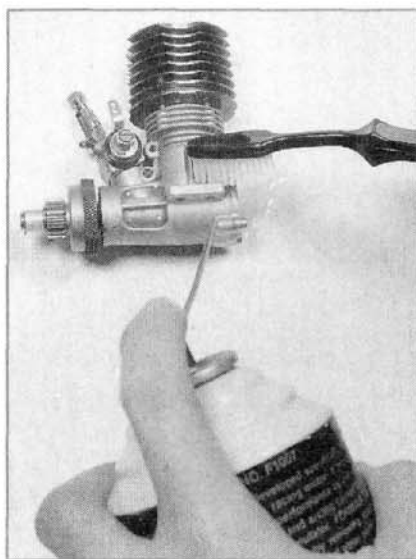
Made in the USA

Install a Piston and Sleeve

by Ken Marcum

IT'S IRONIC that I was asked to write about how to install a piston and sleeve in a gas engine just one day after I had to make this repair between heats at a two-day trophy event. This was at a poorly lighted track, and I was under pressure to finish quickly so that I would have enough time to break in the new parts; to say the least, it was nerve-wracking. Now that I have some pressure-free time and better lighting, let me guide you through this repair. It's easier than it sounds.

The piston and sleeve are always replaced as a pair. Don't ever replace just one or the other. How do you know when to replace them? If your engine won't idle or is running very poorly, try this test: turn your engine over by hand by turning the flywheel. If your piston and sleeve are in good shape, you'll find a point in the rotation at which the flywheel is difficult to turn—a condition called "wedge." If the engine turns freely through its entire rotation, it's time to replace your piston and sleeve. Here's how.



STEP TWO

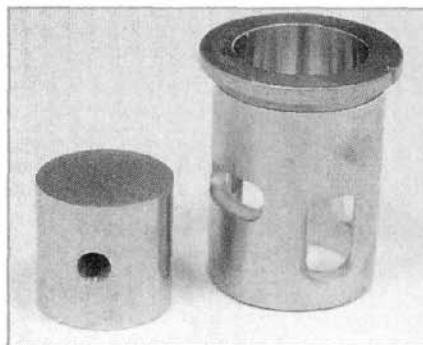
Remove the engine from your car or truck, and clean the outside of its case with a good-quality motor spray to get rid of all the gunk we don't want to find its way inside. Let the case dry thoroughly before you proceed.

After it has dried, carefully remove the head and backplate bolts, and set them aside. Remove the head, taking care not to lose any shims. Take off the backplate. Be careful not to scratch or bend the gasket you'll find there.



STEP ONE

First, clear an area where you can spread your stuff out. You'll need: wrenches to remove the backplate and head bolts (2mm or 5/64 for an O.S.® CZ-R), needle-nose pliers, light oil (Marvel Mystery Oil and WD-40 work well), red or blue room-temperature-vulcanizing rubber (RTV) sealant and, of course, a new piston and sleeve.

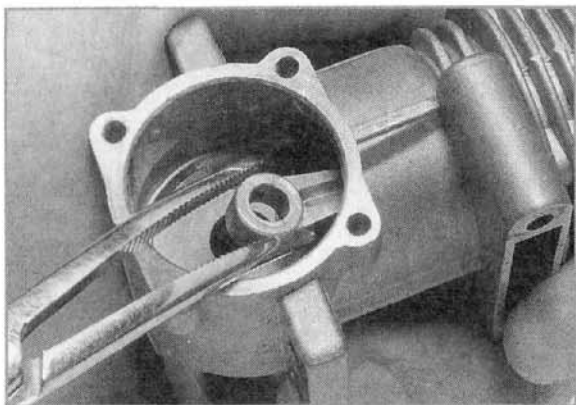


STEP THREE

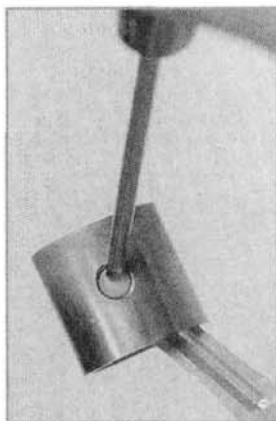
Now, remove the piston and sleeve. You'll notice a notch on the top of the sleeve that lines up with a pin in the engine case; this notch will help you install your new sleeve in the proper direction. The old sleeve may need some gentle coaxing to get it out. You may push the sleeve up with a tool such as pliers or a screwdriver, but be very careful not to scratch the engine case or any other internal parts. To eliminate the risk of damaging anything, put a rag or masking tape over the tool; then, pull the sleeve out by hand.

PHOTOS BY BRIAN LESLIE

STEP FOUR



Gently pull the connecting rod off the crankshaft. To get the rod off easily, you may need to turn the crankshaft. Don't force it. Remove the piston and rod from the top of the cylinder; be sure to first note the orientation of the piston. (On an O.S. CZ engine, there is a large hole in the piston that points away from the exhaust port.) Take care not to lose the Teflon™ guides at the ends of the rod pin.



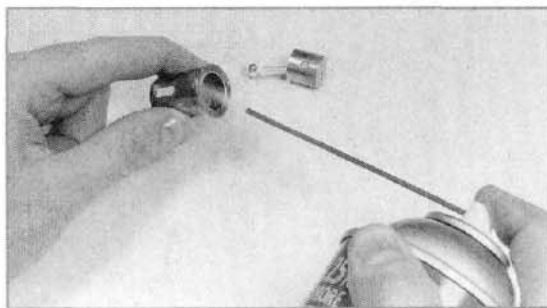
Gently push the pin out with the $\frac{5}{64}$ wrench or a similar tool.

Your engine is now disassembled—easy, huh? Now, replace everything in reverse order, and you've finished. No, seriously, there's a little more to it than that, but not a lot.

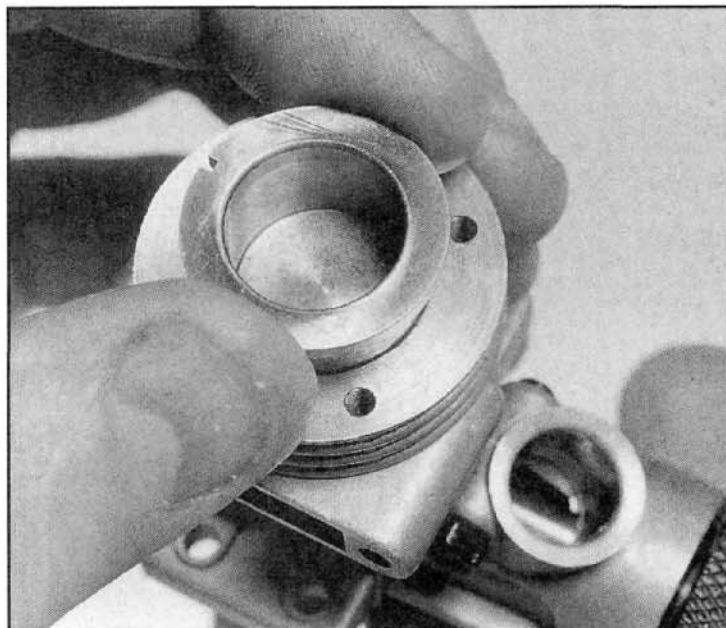
Your first step is to attach the connecting rod to the new piston with the rod pin. Slide the piston and rod into the engine case (without the sleeve), making sure the new piston is in the same position as the old one.

STEP FIVE

Apply light oil, e.g., Marvel Mystery Oil or WD-40, to the inside of the new sleeve, and gently slide the sleeve over the piston; take care not to damage the Teflon™ guides

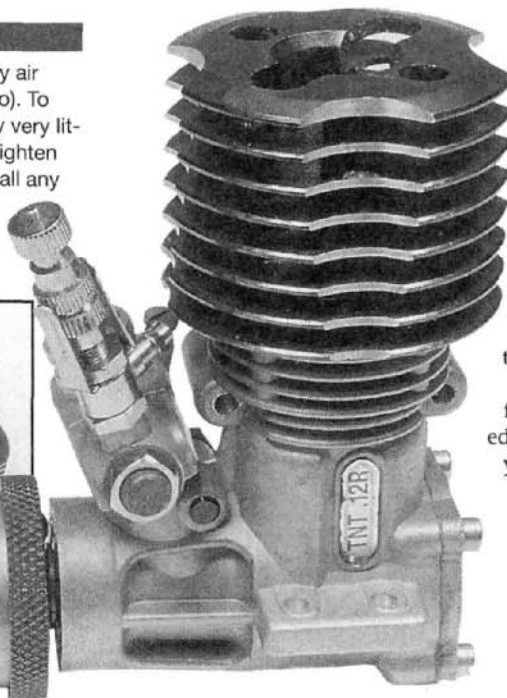
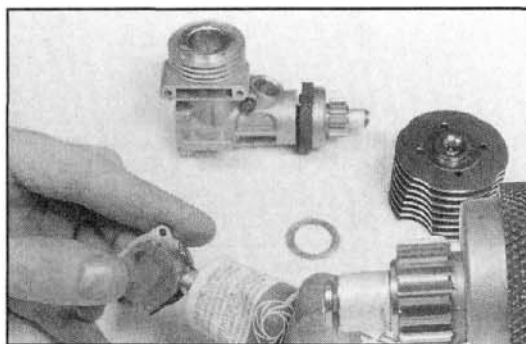


on the rod pin. It's much easier to do this if you turn the crank so that the piston is at the top of its travel. Line up the notch in the sleeve with the pin on the case, and slide the sleeve all the way in. You're on the home stretch now.



STEP SIX

Re-install the backplate and gasket. To eliminate any air leaks, I seal everything with red RTV (blue works, too). To ensure that no sealant gets into the engine, use only very little on the outer flange of the backplate. Install and tighten all screws; finally, install the head. Be sure to re-install any shims that you removed. Tighten the bolts, and guess what? You've finished. See? That wasn't so bad, was it?



Be sure to break in your new piston and sleeve, just as you did when the engine was new. Run a couple of tanks of fuel through it with the engine running as rich as you can get it. Your engine, like mine, should run like new. (I won my Main with the new parts; unfortunately, it was the B-Main, but I won by four laps. Had I replaced the piston and sleeve sooner, it might have been the A.)

So if your engine is down on performance and has lost its winning edge, don't buy a new one until you've tried a new piston and sleeve. You'll get like-new performance for far less money.

**Addresses are listed alphabetically in the Index of Manufacturers on page 166.*

SPONSORED BY KYOSHO & R/C CAR ACTION...

West Coast Gas Off-Road Challenge

by DAN HAAS

HELD AT Valley R/C Racepark in Hemet, CA, during the weekend of January 26 to 28, the '96 West Coast Gas Challenge was an awesome display of ground-pounding nitro-powered action! The weather was cool and sunny when racers gathered to compete for top honors in $\frac{1}{8}$ - and $\frac{1}{10}$ -scale off-road racing. For the fourth consecutive year, Valley R/C Racepark hosted the event. Their redesigned track was ready for all of the pounding and thrashing these monsters could dish out.

QUALIFYING

The weekend started on Friday with sign-in and practice. On Saturday, there were three rounds of qualifying for four classes. Because of the large turnout of racers, two rounds were run on Saturday and one on Sunday.

In $\frac{1}{10}$ -scale Gas Truck, Greg Dennett took the TQ honors with his RC10GT and a time of 16/7:17.04. In $\frac{1}{10}$ -scale Gas Buggy, Kris Moore aced the competition driving a Kyosho Inferno 10. Tim Long led the way in $\frac{1}{8}$ -scale Gas Truck with a 16/7:28 time. Jay Halsey flew around the track with a 18/7:22.56 time and the TQ position in $\frac{1}{8}$ -scale Gas Buggy.

A-MAIN ACTION

The Mains started after the third round of Qualifying on Sunday. With the help of some of the racers, track volunteers John Ruiz and Bill Koller did a little repair work on the track before the Mains. A bump-up system of Sub-Finals and Finals was used for the Mains. The top three drivers from each Sub-Final were bumped up to the next Sub-Final. The top four drivers from the Semifinals are bumped up to the Main Final (A-Main). With this sys-

tem, a driver who started in the K-Main still had the chance to be in the A-Main. In $\frac{1}{10}$ -scale Gas Truck, Team Trinity/Team Losi driver, Brian Kinwald worked his way from the E-Main. This was quite an achievement, considering he had had only minimal practice and dialing-in time with his brand-new Team Losi GTX nitro truck. Apparently, he dialed in his truck as he progressed through the Mains.

• **$\frac{1}{10}$ -scale Gas Truck.** In the first lap, TQ Greg Dennett had a slight problem and dropped back to sixth. Greg Hodapp, Cliff Lett and Curtis Schlat Jr. filled the top three positions. Dennett managed to work his way to second, while Lett moved to first and gained a comfortable lead. Scott Hughes worked his way through traffic and



Top: Team Associated's top engineer, Cliff Lett, proved to the world that he still has what it takes to smoke his competition. With his new Kyosho MP-5, Cliff came from behind to win the $\frac{1}{8}$ -scale Gas Buggy A-Main. Center: with his Inferno 10, Kyosho factory driver Kris Moore dominated $\frac{1}{10}$ -scale Gas Buggy by taking TQ honors and the A-Main. Bottom: Tim Long was unstoppable. Not only did he take the TQ honors, but he also took the overall win in $\frac{1}{8}$ -scale Gas Truck. Way to go, Tim!



closed the gap on Lett; Hughes and Lett battled for first. Hughes made his move on Lett, but he ended up rolling his truck and giving Lett a huge lead over the rest of the field.

With 15 minutes down, the lineup was Lett, Dennett and Hodapp, with Brian Kinwald lurking close behind. Lett came in for a pit stop and dropped back to fourth. Kinwald carefully made his way up to second, waiting for just the right time to make his move on Dennett. With 7 minutes to go, Kinwald bolted to first and built a huge gap between his truck and Dennett's. He maintained his lead to the end and finished 65 laps with a time of 30:24.08. Dennett finished second with 64/30:01.71, and Hodapp and Lett finished in third and fourth.

• **1/10-scale Gas Buggy.** This was the most exciting race of the day, which is surprising, because this was the first time that a 1/10-

The Track

Valley R/C Racepark is operated by a dedicated group of volunteers. Gerry Koller is in charge, and she did an outstanding job of organizing the event. John Ruiz, Bill Koller and Phillip VanNoty maintained the track and kept an eye on things to help ensure the event ran smoothly. Krista Bird was in charge of the computer, and Del Raphael did the play-by-play.

The redesigned track now has a 150-foot straightaway, and the hard-packed clay surface required very little maintenance. The 30-foot drivers' stand is 8 feet above the track, and behind it, the covered pit area has plenty of seats and tables. Ultimate Hobbies set up a booth to sell parts and supplies.

Several racers commented on how well Gerry and her crew organized the event. They are to be commended for their efforts: congratulations to the crew of Valley R/C Racepark for a job well-done!



The folks at Valley R/C Racepark in Hemet, CA, did a fine job hosting the event and provided an awesome racing environment.

scale gas buggy class had been added to the agenda. Throughout the race, announcer Del Raphael's comments entertained everyone. TQ Kris Moore started the race out right with

a full straightaway lead coming into the second lap. Austin Dvorak, with the number-two car, got hung up and dropped back to third, putting Bump into second.



PHOTOS BY DAN HAAS



On the last turn before the straightaway, Moore lost control and allowed Bump to pass, but after Bump barrel-rolled his car, Moore quickly regained the lead. Unfortunately, with 7 minutes down and a full lap lead over the second-place car, Moore flamed out—bummer! That one-lap lead helped him, however, because he was soon back in the race and in third!

Moore knew he had to do some serious driving, and he did. He managed to pass Dvorak, and that put him in second. He was "driving like a man possessed!" With 15 minutes down, Bump pitted, allowing Moore to catch up, and then they were bumper to bumper, until Moore barrel-rolled his buggy. He recovered nicely, though, and was soon on Bump's tail.

Around turn two, Bump and Moore tangled, and Bump's buggy started to drag Moore's buggy along the track. Meanwhile, Del Raphael started yelling "Yeah, we're 'Bumpin' Moore!" At last, Bump managed to break away from Moore, but not for long. Down the straightaway, they tangled again; Moore ended up on his lid, Bump hit into the wall and Dvorak also overturned. When the cars were sorted out, Moore got his lead (gee wiz, talk about aggressive racing!). With 22 minutes down, Moore pitted for fuel but managed to maintain his lead and finish with a 65/30:23.79 time. Tim Bump finished

West Coast Final Results

1/10-Scale 4WD Buggy

Fin.	Qual.	Driver	Chassis	Engine	Pipe	Fuel	Radio	Tires (F/R)
1	1	Kris Moore	Kyosho	O.S.	Paris	O'Donnell	KO	Losi
2	3	Tim Bump	OFNA	O.S.	MIP	Byron	Airtronics	Losi
3	2	Austin Dvorak	OFNA	O.S.	n/a	O'Donnell	Airtronics	n/a
4	9	Cory Merritt	Kyosho	O.S.	Stock	O'Donnell	Airtronics	Pro-Line
5	6	Arthur Lewis	OFNA	O.S.	Lewis/MIP	Dynamite	Futaba	Pro-Line
6	10	Dominick Sansone	Kyosho	O.S.	n/a	O'Donnell	KO	Pro-Line
7	4	Justin Morrison	OFNA	O.S.	MIP	O'Donnell	Airtronics	Pro-Line
8	5	Jim Williams	Kyosho	O.S.	Associated	O'Donnell	Airtronics	Pro-Line
9	7	Chris Walrod	Kyosho	O.S.	Paris	O'Donnell	Airtronics	Losi
10	8	Fred Scadron	OFNA	O.S.	Stock	Byron	Airtronics	Pro-Line

1/10-Scale Gas Truck

Fin.	Qual.	Driver	Chassis	Engine	Pipe	Fuel	Radio	Tires (F/R)
1	3	Brian Kinwald	Losi	O.S.	Losi	O'Donnell	Airtronics	Losi
2	1	Greg Dennett	Associated	O.S.	Associated	Dynamite	Airtronics	Pro-Line
3	2	Greg Hodapp	Losi	O.S.	Losi	O'Donnell	Airtronics	Losi
4	4	Cliff Lett	Associated	O.S.	Associated	O'Donnell	Airtronics	Pro-Line
5	7	Jay Halsey	Kyosho	Paris	Paris	O'Donnell	Airtronics	Kyosho
6	9	Jack Johnson	Losi	O.S.	Losi	O'Donnell	JR	Losi
7	10	Austin Dvorak	Associated	O.S.	Associated	O'Donnell	Airtronics	n/a
8	8	Scott Hughes	Associated	O.S.	Associated	O'Donnell	Futaba	Pro-Line
9	5	Curtis Schlat Jr.	Losi	Dynamite	Losi	O'Donnell	Airtronics	Losi
10	6	Mark Pavidis	Associated	O.S.	Associated	O'Donnell	Airtronics	Pro-Line

1/8-Scale Gas Buggy

Fin.	Qual.	Driver	Chassis	Engine	Pipe	Fuel	Radio	Tires (F/R)
1	7	Cliff Lett	Kyosho	Paris/Picco	Paris	Dynamite	Airtronics	Kyosho
2	6	Greg Dennett	Kyosho	O.S.	Kyosho	O'Donnell	KO	Kyosho
3	3	Yuichi Kanai	Kyosho	O.S.	Kyosho	Full Speed	Sanwa	Kyosho
4	5	Mike Dunn	Kyosho	O.S.	O.S.	O'Donnell	KO	Kyosho
5	10	Magnus Amilon	Kyosho	RB Concept	RB Concept	n/a	JR	Kyosho
6	4	Chris Walrod	Kyosho	O.S.	Paris	O'Donnell	Airtronics	Kyosho
7	1	Jay Halsey	Kyosho	Paris/Picco	Paris	O'Donnell	Airtronics	Kyosho
8	8	Brian Kinwald	Mugen	Rex	Mugen	Mu-Juice	Airtronics	Mugen
9	2	Kris Moore	Kyosho	O.S.	Paris	O'Donnell	KO	Kyosho
10	9	Matt Ledger	Mugen	Rex	Mugen	Mu-Juice	JR	Mugen

1/8-Scale Gas Truck

Fin.	Qual.	Driver	Chassis	Engine	Pipe	Fuel	Radio	Tires (F/R)
1	1	Tim Long	Kyosho	O.S.	Paris	O'Donnell	Sanwa	Kyosho
2	4	Carl Giordano	Mugen	Rex	Mugen	Mu-Juice	Airtronics	Kyosho
3	3	Steve Ozuna	Kyosho	Picco	Paris	Byron	Airtronics	Kyosho
4	5	Scott Parkes	Kyosho	Picco	Paris	Byron	Futaba	Kyosho
5	6	Mike Craddock	Kyosho	O.S.	Kyosho	O'Donnell	Sanwa	Kyosho
6	7	Eddie Payne	Kyosho	O.S.	Paris	Dynamite	Futaba	Kyosho
7	9	Jim Williams	Kyosho	Paris/Picco	Paris	O'Donnell	Airtronics	Kyosho
8	2	Mike Dunn	Kyosho	O.S.	O.S.	O'Donnell	KO EX-10	Kyosho
9	8	Rob Brown	Kyosho	Paris/Picco	Paris	O'Donnell	JR	Kyosho
10	10	Olivind Eichenberger	Mugen	Rex	Picco	O'Donnell	Futaba	Mugen

second with 64/30:12.96, and Austin Dvorak followed with 63/30:22.96.

• **1/8-scale Gas Truck.** The size and weight of these trucks make them an awesome sight as they rip around the track soaking up the bumps. TQ Tim Long got off to an early lead. After a large pile-up at turn four, Mike Dunn had to pit because of car trouble. At the 6-minute mark, Tim Long and Carl Giordano were already one lap ahead of the field. Scott Parkes and Steve Ozuna filled the number three and four positions.

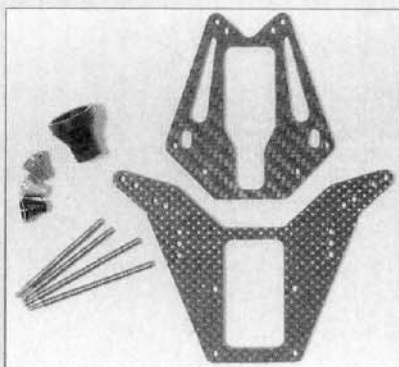
At the 8-minute mark, Giordano passed Long, but going down the straightaway, Long showed that he had the edge on horsepower and he regained the lead. During the next few laps, Long

and Giordano took turns flipping their trucks, while Mike Dunn gained some lost ground. At the 15-minute mark, Long had a one-lap lead on Giordano, Parkes was in third and Ozuna was in fourth. Long maintained his lead for the rest of the race and finished with a 61/30:03.28 time. Giordano finished with 60/30:06.90; Ozuna won the battle for third with a 60/30:10.30; Mike Dunn, who ran an exceptional race, finished eighth with 56/30:04.94.

• **1/8-scale Gas Buggy.** These were the fastest cars on the track. TQ Jay Halsey just couldn't find a line and fell back in the first few minutes of the race. Kris Moore, with the number-two car, had some trouble during practice before the A-Main and, as a result, he started late.



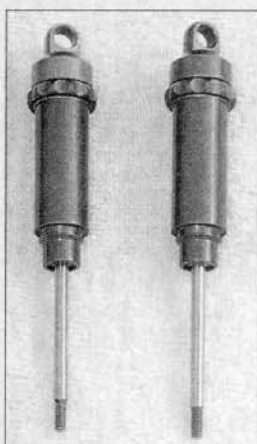
New in the Pits



Associated
Cliff Lett's RC10GT features new front and rear shock towers, a new sleek-looking body and the Unobtainium shock shafts. The new shock towers—part nos. 7216 (front) and 7656 (rear)—give the GT the same suspension geometry as

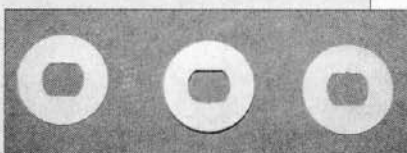
the RC10T2; it improves steering and rough-track handling. The new GT II body (not shown) was designed to fit over the new shock towers and it's extremely narrow, so it produces less

drag. The new shock shafts are made with a new harder coating that has less friction. Also new for the O.S. Max engine is Associated's* carburetor restrictor, which was designed to give the car smoother acceleration and make it easier to drive.



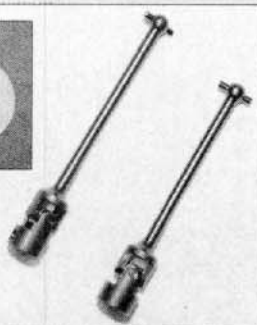
OFNA

From OFNA* come these new, hard-coated, Teflon™-coated shocks. They feature 3.5mm shafts, new Teflon™ pistons and a new silicone seal. OFNA also displayed their new, sealed, aluminum torque-sensing diff (not shown).



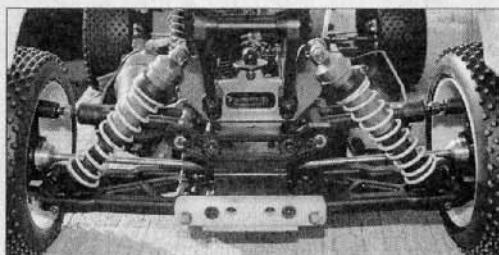
Kyosho

These prototype Kyosho* drive shafts were designed especially for the Inferno MP-5. Also shown here are Kyosho's new fiberglass brake disks.



MIP

MIP's Eustace Moore showed us this nifty little prototype aluminum pivot



support for the Kyosho MP-5. It has optional holes that allow a couple of toe-in and anti-squat adjustments—increased "tunability." Eustace would not confirm that this part will soon be available, so we'll just have to keep you posted.

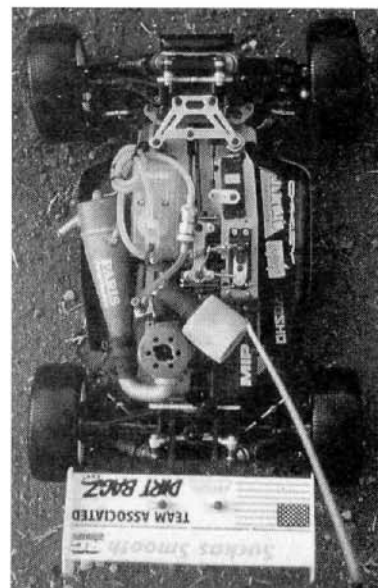


Pit lane just before the start of an 1/8-scale Gas Buggy heat. Holding a couple of horses in your hand isn't all fun and games!

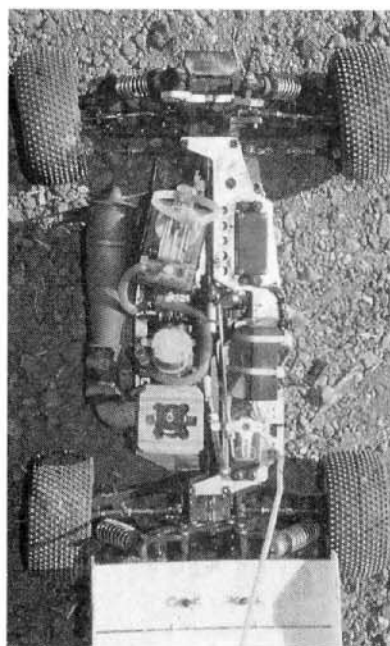
With 5 minutes down, Cliff Lett gained the lead and soon built a huge gap between his buggy and the rest of the field. Yuichi Kanai secured second, while Mike Dunn and Greg Dennett claimed third and fourth, respectively. Consistent driving kept Cliff Lett in the lead for the entire race. Dunn, Kanai and Dennett battled for the next three positions. Lett finished an amazing 69 laps with a time of 30:27.83; Greg Dennett finished at the same time with 68 laps; Yuichi Kanai came in next with 67/30:03.68; and Mike Dunn finished fourth, about 15 seconds behind Kanai.

After nearly 18 hours of racing (that's right, 18 hours!), the drivers and crews were ready to head back to their

hotels. The last A-Main finished at 3 a.m. on Monday, but despite the long hours, many of the drivers stuck around to the very end. Gerry and her crew were still going strong, even after everyone had gone. In my opinion, the '96 West Coast Gas Challenge was a winner! Everyone had a good time, and that's what the R/C hobby is all about!



Jay Halsey's top qualifying buggy.



Kris Moore's Kyosho Inferno 10.

*Addresses are listed alphabetically in the Index of Manufacturers on page 166. ■

Rematching Ni-Cd Batteries

New Partners for your Old Cells

by Doug Mertes



WHEN I COUNTED the 1700SCRC cells that I have accumulated over my last few years in R/C, I found that I had 78 that ranged in age from 18 months to 4½ years. The newest cells had been cycled at least 40 times, and some of the oldest had been cycled more than 200 times! Most of these are matched cells that have been used, but not abused. I cycle my cells regularly, always at the same charge and discharge rates. Although my run times were still very competitive, I was curious: all else being equal, would I attain better speeds if I rematched my cells and grouped the better batteries? I decided to find out.

PREPARATION

According to their original matching labels, my cells had run times from 350 to 370 seconds at 20 amps (although some of them had originally been matched at 25 or 27 amps), and none had an average voltage lower than 1.13. To keep track of the results of the tests I was about to make, I set up a computer spreadsheet that listed the original matching company, date codes and labeling; because I wanted to clean

the cells and remove old labels, I also made new labels on which I wrote a new number for each cell.

While the packs were still assembled, I charged them at 6 amps, peaked them twice and then discharged them using a 12-bulb discharger that produces a discharge rate of about 20 amps. After waiting 24 hours to allow the cells' temperature to stabilize, I disassembled the packs into individual cells. Because I had used single-cell shrink-wrap and had glued the cells together with Shoe-Goo, it was easy to pull the glue away using a pair of needle-nose pliers before I removed the individual battery bars with a hot Ungar® soldering iron. After slicing and removing the old individual-cell shrink-wrap that had protected the black wrapper, I scrubbed each end of the cells with a stiff, dry toothbrush to remove dirt, dust, corrosion and flux residue. Now I had to remove the solder that remained on the cell ends. What's the best way to do this?

REMOVING SOLDER

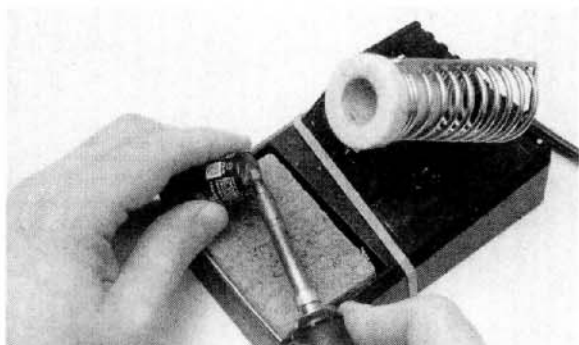
Because solder inhibits electron flow during matching, it's important to remove as much of it as possible. Don't damage the cells' internal structure with excess heat, and don't remove any of the plating on the contact, or you will negatively alter cell characteristics and turn a good cell into a mediocre one.

After consulting several battery matchers and fellow racers about their preferred ways of removing solder from cell ends, I experimented. I found that the following method will yield the best run times and voltages:

- Heat a high-output soldering iron for a couple of minutes, and with its tip, melt the solder that remains on the end of the cell.
- Tilt the cell at a 45-degree angle, and allow the melted solder to drip off the end of the cell onto the iron's tip. I did this over a wet sponge so that any solder that dripped off the end of the iron would solidify harmlessly on the sponge, instead of burning my pants or the work surface.
- Grind off any remaining solder nubs with a Dremel® Moto-Tool, using a medium-grit sanding drum at moderate speed. Be careful! You don't want to remove any of the plating on the end of the cell.

REMATCHING

Store the cells for 48 hours at room temperature so that their internal temperature will stabilize. To match the cells, I used the R/C industry's standard: a Competition Electronics®



Make sure that you remove as much solder as possible from the ends of the cells, but don't overheat them.

Turbomatcher 20 that had been lent to me for this article by the company's president, Ron Bailey. Although this unit doesn't have the 30A discharge capacity or internal-resistance measurements of later models, it is still an outstanding tool for measuring cell capacity and average voltage at a controlled-discharge rate.

The Turbomatcher charges each cell individually at a rate set by the operator (in this case, 6 amps), followed by a delay after the initial peak, then a re-peak at the same rate, and then immediate discharge. After each set of six has been fully discharged to a set level (I used the unit's 0.90V default setting), the unit beeps repeatedly, so you know that it's time to download the cell information and set up another group of cells. The unit offers two information options: a summary (what we usually think of as a matching label) that includes charge time, charge rate, discharge time, discharge rate and cell-ID number; and a printout of the discharge curve of each individual cell, so that you will be able to see how rapidly the cell voltage went down during discharge.

It takes about 35 minutes to run a set of six cells through the entire cycle; the results are printed on labels or paper with a standard 9- or 24-pin computer printer. The information is indexed by cell-ID number; plan this carefully, and these numbers will match the new index numbers you put on the cells when you disassembled the packs. Neat, huh?

Because all my cells had been cycled recently, there was no false peaking during the rematching process. I set a timer that alerted me when 2 minutes of charge time had passed on the matching unit. I then hit the stop button, waited a

second, and restarted the unit. With a couple of minutes' charge in them, not a single cell of the 78 that were rematched peaked prematurely.

After running each Ni-Cd cell through the rematching cycle, I had a lot of information about them. What would I do with it?

PUTTING THEM TOGETHER

I could have simply removed the old cell labels, reprinted new ones, and arranged the cells into closely matched groups, mixing and matching until I came up with the best combinations. But, hey, you know that I'll come up with something much better than that! Remember the spreadsheet I set up when this whole process started? On the same spreadsheet, I entered the

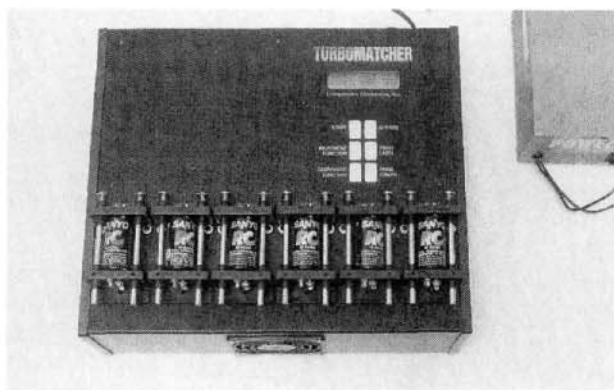
"It took several days to cycle, disassemble and rematch all these cells, but the results were worth it!"

new cell information, including average discharge voltage and run time.

Using the "sort" option in my spreadsheet software, I went through several "if/then" sorting operations. For the cells with rematch run times of 350 seconds or more, these were:

- by voltage and run time (this grouped the cells by top voltage, for stock-class packs)
- by run time and voltage (this grouped the cells by longest run time, for modified-class packs)
- by date code, voltage and run time (this illustrated the commonality of various date codes and cell ages).

I'll use cells with discharge times of less than 350 seconds for off-road stock and modified racing, where run time is typically less critical. I'll use cells with discharge times of less than 330 seconds in practice packs and in 4-cell packs for breaking in



This Turbomatcher from Competition Electronics is the industry standard. It will give you all the information you need to rematch your cells properly.

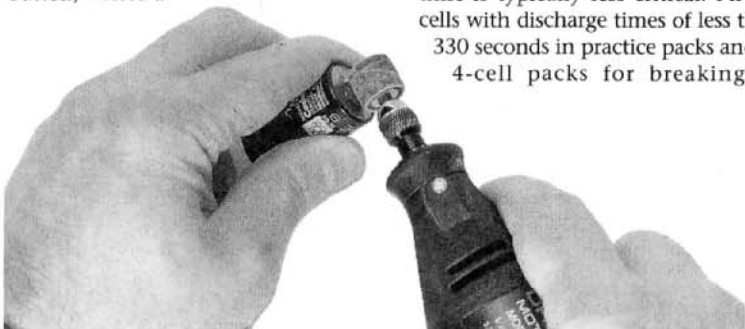
motors. I'll also use them as power cells in a radio-transmitter project that I've been meaning to get to for some time.

RESULTS

Was all of this work really worth it? That depends. I had many cells to work with. If I had owned just four packs of badly maintained cells, I doubt that rematching would have done me much good. Out of that many cells, I probably would have wound up with one decent voltage pack and—maybe—one decent run-time pack.

On the other hand, you and your friends could pool your cells, clean them and send them to a rematching service (these are advertised in *R/C Car Action*); the result would be enough useful packs to make the project worthwhile. Of course, you would be without these batteries for a couple of weeks, and you would all have to agree on how to share the good packs.

If you race exclusively in the stock class and you don't overcharge your cells or charge them too frequently, and if the cells you have were pretty good when you bought them, you'll probably find that they haven't deteriorated very much. If your packs don't exhibit problems such as false peaking, low voltage and inconsistent run times, then rematching your cells probably won't do much good. The higher discharge rates experienced in modified-class racing, however, usually result in an eventual reduction in both run time and average voltage. If you run in a modified class, especially in oval and 1/12-scale classes, it pays to buy fresh cells regularly and to rematch your existing cells to make sure you're getting the most out of what you have.



After most of the solder has been removed, take off the last little nubs with a Dremel tool and a sanding drum. Be careful not to remove the contact plating!

*Addresses are listed alphabetically in the Index of Manufacturers on page 166. ■

From the track to the parking lot.
This is the R/C action as **you** see it.

Grassroots

This is YOUR PAGE! That's what "Grassroots" means; go on, look it up! You know we're right. What other magazine gives its readers an entire page to strut their stuff? Where else can you show the world—yes, everywhere from here to there—what you and your R/C friends are doing? Wanna brag? Here's the spot. Show us your local racing scene! Send photos with captions to "Grassroots Racing," *Radio Control Car Action*, 251 Danbury Rd., Wilton, CT 06897-3035.



Wayne Hall II and his teammate Mark Jenks started to race R/C cars a little over a year ago, and now, so they say, they're up to their necks in it. For the second year in a row, they put on a demonstration—Race Fever—to introduce R/C racing to the good folks of Concord, NH. It's held on Winston Cup weekend, so those who can only dream of racing a full-size racecar can also experience the thrill of racing action. Approximately 45,000 people converge on Main St. for a chance to try their hand at R/C racing; they can choose from among planes, boats and all classes of cars, buggies and trucks. Celebrity drivers (full-size racing) are there to sign autographs, and manufacturers sell



R/C Conquers Concord

products and apparel; there's also a contest, music and food. Wayne says R/C may be only one tenth as popular as full-size racing, but it's 100 percent of the fun. Special thanks to Dave Segal and the Concord Chamber of Commerce, Roberts Railroad and Hobby and the many others who make Race Fever a smashing success.



Sixty-seven racers and 93 spectators flocked to Tracksides Hobbies in Glendale, WI, for another fun-filled day of racing.

**Tamiya
America
No. 24**



F1

1. Mike Wenzel
2. Tony Balisterri
3. Marty Hageman

4X4 TRUCK

1. Christopher Huck
2. Brad Johnson
3. Carl Seils

FWD SEDAN

1. Jesse Mosca
2. Greg Jones
3. Jim Spychalla

GTP & GTO

1. Greg Jones
2. Jeff Howard
3. John Wicht

4WD SEDAN

1. Mike Wenzel
2. Nathan Johnson
3. Scott Ernst

M-CHASSIS

1. Jonathan Mosca
2. Al Iverson
3. Marlon Green

TOP QUALIFIER

- F1 Alex Kikel
4WD Scott Ernst
FWD Jesse Mosca
Truck Christopher Huck
GTP/GTO Jeff Howard
M-Chassis Jonathan Mosca

BEST OF SHOW

- F1 Scott Wilson
4WD Greg Jones
FWD Greg Jones
Truck Rob Wilkinson
GTP/GTO Ken Jones
M-Chassis Marlon Green

TOP ROOKIE

- F1 Paul Lemieux
4WD Sedan Chad Neilson
GTP Kaitlyn Wilkinson



call now!

Whether you're a dealer or just a bunch of fun-lovers in search of a race program, call now! Here are a few hotline numbers to call if you have any questions, or if you'd like to start a program in your area.

Bolink Legend Series

(404) 963-0252

Tamiya R/C Championship Series

(800) TAMIYA-A

Kyosho R/C Sport Racing

(800) 682-8948 ext. 085F

Hobby Shack Parking Lot

(714) 964-8846

Hobby Town USA Parking Lot

(402) 434-5050

Trinity's Street Spec Series

(908) 862-1705

GOIN' FAST IN THE PHILIPPINES

Above and right: the club's off-road track is 500 meters long and is equipped with AMB lap-counters and a pit area with electric outlets and an air compressor. They have also recently added a 530-meter on-road asphalt track.



Jerry Garcia (no, not that one)—president of Radio Control Modelers of the Philippines—says that the First Philippines R/C Invationals were held at their track this past spring. Twelve teams from 12 countries participated.

SPEC SERIES KICK-OFF



Trinity started the 1996 National Street Spec Series with a bang. Hosted by Scooter's Hobby Hut in Niles, OH, Race 1 was quite a success. Forty racers took the track to compete for the first titles of the new racing season.

Above: the entrants—including a few of Trinity's factory drivers—smile for the camera.

PRO-SPEC

1. Jake Flurer
2. Brian Burkhart
3. George Verbonitz
4. Jim Deiter
5. Charlie Suangka
6. Rick Icker
7. Eric Chambers

SPEC

1. George Verbonitz
2. Brian Buckhart
3. Eric Chambers
4. Bob Grant
5. Howard Kemery
6. Phil Jones
7. Ed Thuresson
8. Leroy Davis

Below: the A-Main winners accept their trophies—and bragging rights.

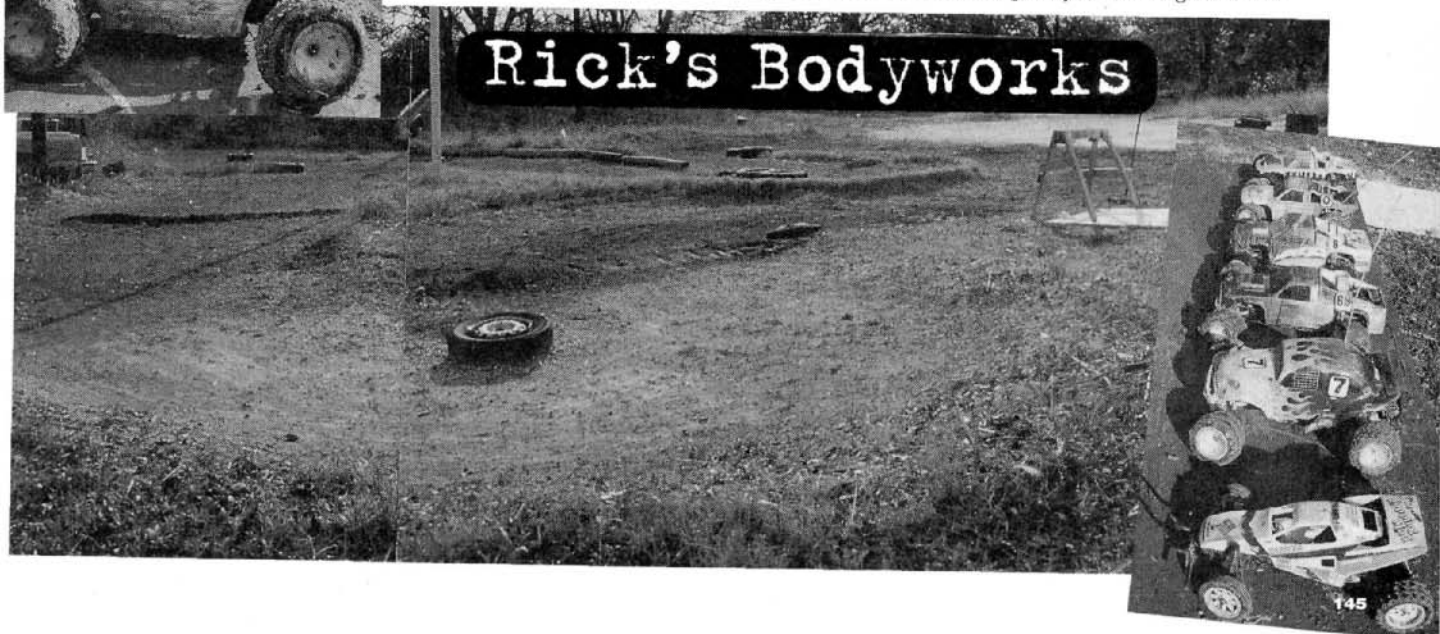


Above: Richie Kurtz—the youngest street spec racer.



Rick Thompson of Rick's Bodyworks sent us these photos of the off-road R/C track that's behind his shop. He says that nine enthusiasts regularly race on this 246-foot track, and they're hoping to set up an organized race program. So if you're in Boerne, TX, and are looking for R/C racing action, call Rick at (210) 981-4140. There's plenty of dirt to go around.

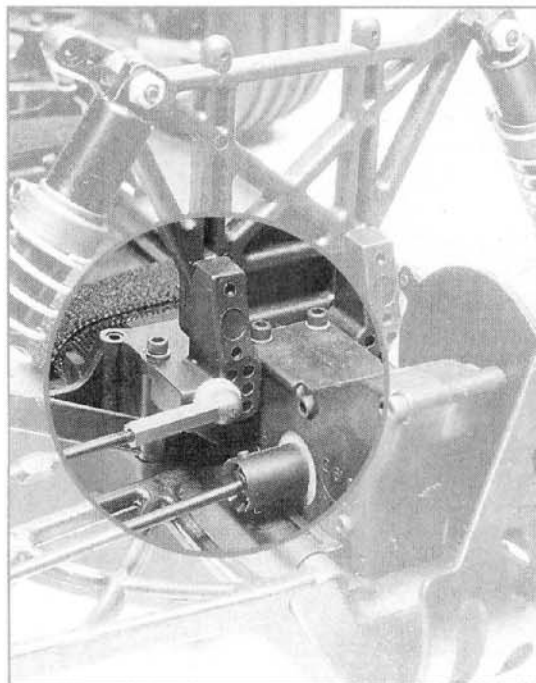
Rick's Bodyworks



Understanding Roll Center

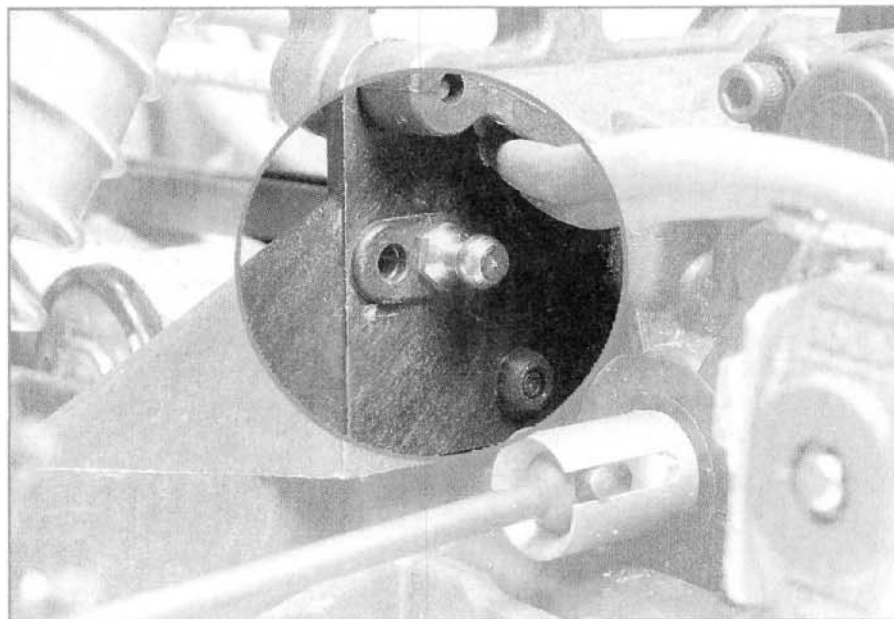
A crash course in
camber-rod placement

by Jack Johnson



Certain vehicles, e.g., this Team Losi Double-XT, have a multitude of camber-link locations. Each choice affects the vehicle's roll center in a particular way.

MOST ENTHUSIASTS—those who race competitively and those who just have a good time driving with friends—understand most aspects of tuning their cars. Adjusting damping and changing springs, shock angles and ride heights is pretty straightforward and simple to understand. But when discussing car setup, there's one area most people avoid like the plague—camber-rod locations and their effects on handling.



Team Associated's new RC10B2 has only two camber-link locations on its rear bulkhead. By moving the camber link inward, you increase how much roll-center change there is during suspension travel. By moving the link outward, you decrease roll-center change.

I admit I'm no different from anyone else when it comes to discussing this topic. As a matter of fact, the editors at *Car Action* have been trying for some time to get me to write an article on this subject. Until now, I've been able to talk them out of it!

First, a little general knowledge. Although most people think that when they move a camber link, they're only changing camber rise (see glossary) throughout the suspension's travel, the real change is to the suspension geometry. Basically, when the camber-link's position is changed, the car's geometry is changed in an area called "roll center." Roll center is the point in space around which the chassis rolls from side to side when the weight is transferred as it corners. This is a difficult subject to explain because it's hard to explain what roll center does once the chassis starts to roll or lean to the side.

THE BASICS

As I mentioned earlier, roll center is the point in space around which the chassis rolls from side to side when its weight transfers during cornering. When calculating roll center, you consider chassis dimensions such as:

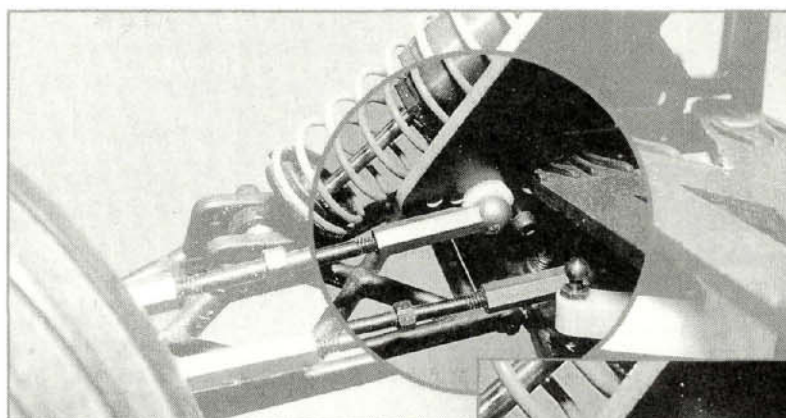
- suspension-arm length;
- axle height;
- the suspension-arm's inside pivot height;
- inside and outside camber-link locations.

On most R/C cars, you can change only the inside and/or outside camber-

link locations, so I'll concentrate on these adjustments.

Why does roll center make a difference? Naturally, with the weight of the battery pack, engine, motor and other heavy items, most of an R/C car's weight rests above the chassis. Just as there is a center of gravity (CG) from front to rear on a chassis, there is also a CG from top to bottom. The "true" CG of a chassis takes into account both front to rear weight as well as top to bottom.

A car's CG is important because it's the point around which the weight of the chassis will want to roll from side to side. But it is the chassis's roll center that determines the point around which the chassis will roll—not the car's CG. Rarely, if ever, do the CG and roll center coincide, but CG does affect chassis roll through the chassis's roll moment, which is the difference between the height of the roll center and the height of the CG



By altering the length of the front camber link, you can change how much initial turn-in a vehicle has. If you lengthen it, you'll increase low-speed steering and make high-speed steering less sensitive. If you shorten it, you'll increase high-speed steering.

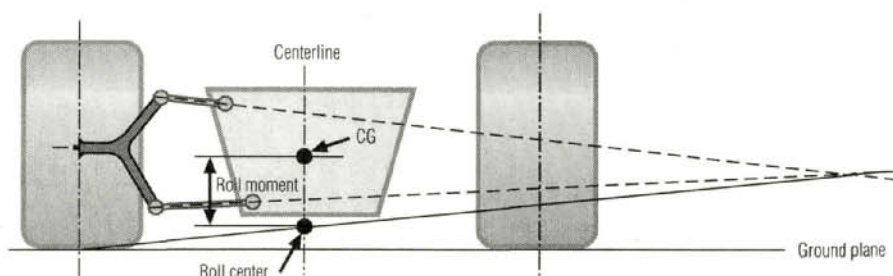
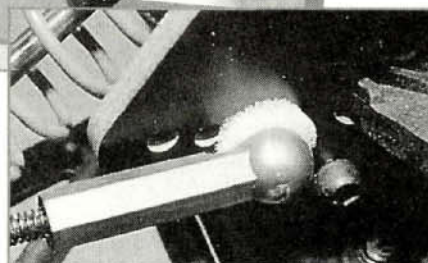


Figure 1. Determination of roll center and roll moment arm.

GLOSSARY

Camber rise: how much the tires' camber angle increases during suspension travel.

CG: center of gravity. The point at which your car balances in all directions, i.e., the center of its weight.

Roll axis: both the front and rear suspensions have their own roll centers. The roll axis is an imaginary line that connects the front and rear roll centers, around which the chassis rolls.

Roll center: roll center is the point in space around which the chassis rolls from side to side when the weight is transferred as it corners.

Roll moment: the distance between the height of the suspension's roll center and the the car's CG. The greater the distance (moment), the more easily the chassis will roll.

(see Figure 1). This term is important because once you've determined the roll center, the roll moment determines how easily the chassis can roll from side to side.

Current suspension design dictates that the roll center will almost always be below the vehicle's CG (at least, when the vehicle is at ride height), so the greater the roll moment, i.e., the distance between the CG and roll center, the more easily the chassis will roll. Conversely, the higher the roll center, or the shorter the roll moment, the more resistance there will be when the chassis tries to roll.

CALCULATING ROLL CENTER

OK! Here we go. To calculate roll center (front or rear) look at the car from one end while it's at ride height. If you're enough of a diehard to actually want to calculate your car's roll center, you'll have to accurately measure:

- the heights of all the hinge pins and how far each is from the chassis centerline;

- the heights and positions of the camber-link pivots;
- the point at which the tire's centerline contacts the ground.

You'll need a large piece of paper that has lots of room for you to draw really long lines. First, draw a line straight down the middle of the tire to the ground (see Figure 1). This line will be at an angle if there is anything other than zero camber.

Next, draw a line straight across the left suspension arm (let's work with the left side) that will pass directly through the center of the inside and outside hinge pins and go to a point that's well past the right side of the car.

Now draw a line that passes straight through the inside and outside pivots of the camber link. Extend this line past the right side of the car until it intersects the line you've already drawn through the lower suspension arm. Beginning at the point at which the two lines intersect, draw another line that extends to where the tire's centerline touches the ground. The point at which this line intersects the chassis centerline is the roll center.

HOW DO THE FRONT AND REAR WORK TOGETHER?

When you've determined both the front and rear roll centers (following the procedure outlined above), you can then find the roll axis (an imaginary line that connects the front roll center to the rear roll center). The roll axis' position tells you how much steering or rear traction you will have. If the front roll center is lower than the rear, the front suspension will

UNDERSTANDING ROLL CENTER

roll more easily than the rear. Lowering the front suspension's roll center further increases steering. If the rear roll center is lower than the front, the car will roll more easily across the rear suspension than across the front. Lowering the rear roll center will improve rear traction.

Before I can tell you how making simple changes to the camber link's position will affect your roll center, there's one more thing I need to try to explain. As your car's suspension moves through its range of travel, the roll center almost always moves with it. How far the roll center moves in relation to the suspension travel will depend on the suspension's geometry.

If the front-suspension travel drastically affects the front roll center, steering will increase when the car slows to corner and its suspension is compressed. A drastic roll-center change during rear-suspension travel makes the chassis roll more easily. If the rear of the chassis rolls too easily, the car feels "loose" because the chassis will be rolling back and forth without becoming centered.

GENERAL GUIDELINES

Now that I've given you some information about what roll center is and I've bored you with the details of how to calculate it, I can give you a general guide to follow when you decide to adjust a camber link's position.

On some vehicles, you have the option of moving both the inside and the outside camber links.

• **Outside-camber-link adjustment.** This is easy to remember. If the position of the outside of the camber link is lowered, the

roll center will also be lowered; so logically, raising the outside position of the link raises the roll center.

• **Inside-camber-link adjustment.** This has the opposite effect. If the inside position of the camber link is lowered, the roll center will be raised. If the inside position of the link is raised, the roll center will be lowered. These rules apply to any car, full-size or R/C, and to both the front and the rear suspension.

What about roll-center change during suspension travel? Well, the general rule is that the longer the camber link, the greater the change (as long as the inner and outer link heights remain the same). So if you move a ball stud straight inward—lengthening the camber link—you'll increase the roll-center change associated with suspension travel. If you move the inside camber link outward—decreasing the link's length—you'll decrease roll-center change. This roll-center change has a very noticeable effect on the front suspension. For the most part, lengthening the front camber link will increase low-speed steering and make high-speed steering less sensitive. The negative side to this is that high-speed steering will be greatly diminished.

Shortening the front camber link increases high-speed steering, but also reduces low-speed steering.

Unfortunately, I can't generalize about the rear suspension. My only suggestion is that you avoid shortening the rear camber link so much that the camber changes drastically as the suspension is moved through its range of travel.

Also keep in mind that when the sus-

Want to know more?

To thoroughly explain the intricacies of roll center and camber-link location, I'd need to take up this entire issue, but there are a couple of books that are informative and easy to understand: "Tune to Win" by Carroll Smith and "Race Car Engineering and Mechanics" by Paul Van Valkenburgh. Both are easy to read and tell how to check roll centers and what they do. They'll get you started on your way to understanding this messy subject.

pension arm is perfectly level, the inside of the camber link should always be *lower* than its outside. If the inside is *higher* than the outside, the camber will change from negative, to positive, back to negative again during suspension travel. Your car won't be able to handle bumps.

ROLLING TO A CONCLUSION

That's about all I can tell you without either writing a book or totally confusing you. I hope I've given you enough basic knowledge of how roll centers work and how they can affect your car's handling. You should be able to go out and give it a go yourself.

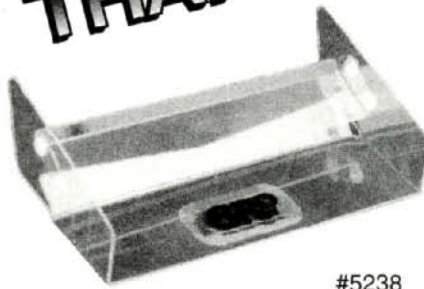
Like anything else you might test on a car or truck, try to keep track of what happens when you make a change. Take notes. The more attention you pay to the adjustments you make and how each one alters handling, the better understanding you'll have of all the setup adjustments that you can make to your car. ■



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All Seasons Hobby, 152 O'Fallon Plaza, O'Fallon, MO 63366; Bob Daniels, (314) 281-8767
A00000

B&L Hobbies & Raceway, 2800 Anchor Dr., Park Hills, MO 63061; Bob Marler, (314) 431-9444
A00000

Blue Vue Speedway, 12019 E. 47th St., Kansas City, MO 64133; Mark Randol, (816) 358-0238
A00000

Columbia R/C Trax, 1502 W. Bus Loop 70 (Exit 125), Columbia, MO 65202; Gary Phillippe, (314) 682-3993
A00000

Greentree R/C Racepark, St. Louis Dirt Burners R/C Club, Marshall Rd., Kirkwood, MO; (314) 831-2194
A00000

Hobbies 'n Stuff Raceway, 102 West Pearce Blvd., Wentzville, MO; Tim Satchwell, (314) 327-6066
A00000

Mid-Mo R/C Raceway, 400 W. 2nd., Sedalia, MO 65301; (816) 826-5113
A00000

Ozarks R/C Raceway, Hwy 13, Brighton, MO 65781; Gene Rhodes or Ron Hawkins, (417) 742-4376 or (417) 742-2561
A00000

Suppenbach Winter Racing, Route 5, Box 66, Pleasant Hill, MO 64080; Larry Suppenbach, (816) 987-5828
A00000

MONTANA

Stormer Raceway & Slot Motorplex, P.O. Box 126 Hwy 2 East, Glasgow, MT 59230; (406) 228-4569
A00000

Thunder Road Racetrack, 110-E Centennial Dr., Livingston, MT 59047; Dominic Papa, (406) 222-1352
A00000

NEBRASKA

Goodyear Superspeedway and Off-Road, 4021 North 56th, Lincoln, NE 68510; Tom or Bob, (402) 464-5000
A00000

Mr. Bill's, 450 West 2nd St., Hastings, NE 68901; Bill J. Ries, (402) 462-4865
A00000

Wild Card Raceway, RR1 Box 137, Columbus, NE 68601; Roger F. Miller, (402) 564-7743
A00000

NEVADA

Dansey's Indoor R/C & Hobbies, 741 N. Nellis, Las Vegas, NV; David Lugo, (702) 453-RACE
A00000

Silverbowl Speedway, 7274 Hardtack Cir., Las Vegas, NV 89119; Mike, (702) 896-3577
A00000

Western R/C Raceway, 6404 Richmar, Las Vegas, NV 89139; Randy Grigg, (702) 897-7227
A00000

NEW HAMPSHIRE

Economy R/C Speedway, 4 Maple St., Winchester, NH 03470; Harold Thomas, (603) 239-4482 or 239-6470
A00000

Fastracker Club, 520 Washington St., Keene, NH 03431; Bill Phillips or John O'Connor, (603) 357-8393
A00000

Hobby Etc., Heritage Place, Rt. 101A, Amherst, NH 03031; (603) 595-8549
A00000

Open Season Sports Center, Rt. 302, Lisbon Rd., Lisbon, NH 03585; Joseph Wiggett, (603) 838-6602
A00000

Outback Raceway, East Washington Rd., P.O. Box 508, Bradford, NH 03221; Jim or Bill Thompson, (603) 938-2425
A00000

RT 106 Racepark, 743 Clough Mill Rd., Pembroke, NH 03275; Douglas Graves, (603) 224-RACE
A00000

NEW JERSEY

Bob's American Raceway, 142 Wilson Ave., Englishtown, NJ 07726; Bob Morrisico, (908) 446-3737
A00000

Family Hobbies Raceway, 3576 N.W. Blvd., Weymouth Rd., Vineland, NJ 08360; Linda Vogel, (609) 696-5790
A00000

Golden Hobbies Raceway, 415 Erial Rd., Pine Hill, NJ 08021; John or Iona Golden, (609) 782-1222
A00000

Jefferson Speedway, 5494 Berkshire Valley Rd., Oak Ridge, NJ 07438; (201) 697-7525
A00000

LBRA Track, 392 Warburton Pl., Long Branch, NJ 07740; (908) 222-5122
A00000

Millville R/C Oval, 114 N. High St., Millville, NJ 08332; William Denstoz, (609) 327-4640
A00000

Pit Stop Dragway, Campus Rd., Totowa, NJ 07512; Kimberly Frank, (201) 956-RACE (7223)
A00000

The Race Place, 1151 Hwy. 33, Farmingdale, NJ 07731; John Fary, (908) 938-5215
A00000

On Trax Hobbies, 1549 Rte. 70, Browns Mills, NJ 08015; Joseph DiGirolamo, (609) 735-0422
A00000

Zeppelin Hobbies, 92 Rt. 23N, Riverdale, NJ 07457; Lou Ballini, (201) 831-7717
A00000

NEW MEXICO

Meerscheidt R/C Raceway Park, Walnut and Hadley, Meerscheidt Park, Las Cruces, NM 88001; Wayne Ward, 2230 Coleen Ct., (505) 523-4863, (505) 526-1758
A00000

BarnStormers, MD #1 Old Oxford Rd., Chester, NJ 10918; Lou, (914) 469-8206
A00000

Beach Hill Speedway, 1760 Beach Hill Rd., Watkins Glen, NY 14891; Jim Riley, (607) 535-2616
A00000

Brian's Off-Road Track, 1124 N. Forest, Williamsville, NY 14221; Brian Was, (716) 633-8155
A00000

Brookport Speedway, 6000 Sweden Walker Rd., Brookport, NY 14420; Gil & Betty Glidden, (716) 637-6224
A00000

Brownie's Pro & Sport Hobbies, 124 Bennett St., Staten Island, NY 10302-1426; John Brown, (718) 727-2194
A00000

C&D Raceway, 12542 NYS Rte. 12E, Chaumont, NY 13622; Chris or Don Bourquin, (315) 649-5403
A00000

Capital District R/C Racers, 27 Venus Dr., Albany, NY 12205; Keith Green, (518) 783-7859
A00000

Central New York R/C Auto Racers, Martin St., P.O. Box 116, Rome, NY 13440; John Orr, (315) 336-5140
A00000

Chipmunk Hill R/C Speedway, 217 Pine St., Theresa, NY 13691; Ted or Pete House, (315) 628-5065
A00000

Hal's Hobby Shop, 120 Cayuga St., Fulton, NY 13069; Hal & April Halstead, (315) 598-2772
A00000

Hobby Images R/C Raceway, 89 Jerusalem Ave., Hicksville, NY 11801; Chris LaRussa, (516) 822-8259
A00000

Jerry's Raceway, 111 S. Applegate Rd., Ithaca, NY 14850; Jerry and Lori Achilles, (607) 277-0940
A00000

Li 1/4-Scale Racers, 63 Horton Dr., Huntington Station, NY 11746; (516) 351-5384
A00000

Long Island Raceway, 168 Broad Hollow, Farmingdale, NY 11735; Jane, (516) 845-7223
A00000

The Model Shop, 1 Lakewood Ave., Monticello, NY 12071; Richard Cimino, (914) 791-6075
A00000

Mountain Raceway, Budd Rd., Phillipsport, NY; Joe Colombo, (914) 647-1121
A00000

National Hobby Supply, 25 1/2 Webb Rd., Middletown, NY 10940; Bruce Roosa, (914) 342-6786
A00000

N.Y. R/C Raceway, 300 W. 55th St., New York, NY 10019; Jack Zelter, (212) 956-7296
A00000

Performance Plus Radio Control Speedway/The Hobby House, 1141 1/2 Jones & Gifford Ave., Jamestown, NY 14701; (716) 488-1772
A00000

P.R.D. Speedway, 5 Washington St., Catteragus, NY 14719; Marc Pritchard, (716) 257-3101
A00000

R/C Hobbies, Rt. 49, Box 138, Constantia, NY 13044; Roy Catholdi, (315) 623-9536
A00000

R/C Sport Hobby, 69-57 Juniper Blvd., South, Middle Village, NY 11379
A00000

R&S Hobbies, 356 Macedon Ct. Rd., Fairport, NY 14502; (716) 425-3722
A00000

Rampage R/C, 27 Fuller Ln., Hyde Park, NY; Brian Walker, (914) 229-2456
A00000

Ringwood Junction, 1922 Dryden Rd., Freeville, NY 13068; Steve Miller, (607) 347-4198
A00000

Schoharie Co. R/C Car Club, P.O. Box 126, Cobleskill, NY 12043; (518) 234-4600
A00000

Small Torque Racers of Long Island, 13 Melony Ave., Plainview, NY 11803; Thomas Bolger, (516) 938-9005
A00000

Southerly Raceway, 88 Paige St., Owego, NY 13827; Anita Harding, (607) 687-5395
A00000

South Shore Hobby & Raceway, W. Roe Blvd., Patchogue, NY 11772; Don Hauck, (516) 758-5567
A00000

Speedworld R/C & Hobby, P.O. Box 482, Chenango Bridge, NY 13745; Michael Magnusson, (607) 648-2063
A00000

Tri County Remote Control Car Club, 33 West Decker St., Johnstown, NY 12095; Jim Sprouse, (518) 762-8884
A00000

Ulster County Speedway, P.O. Box 71, New Paltz, NY 12561; Joe Colombo Jr., (914) 754-7664
A00000

Walt's Hobby, 2 Dwight Park Dr., Syracuse, NY 13209; (315) 453-2291
A00000

Westfield R.C. Speedway, 27 Clark St., Westfield, NY 14787; John or Jared Lindstrom, (716) 326-2339
A00000

Whitestone, 30-56 Whitestone Expy. (Dept. of Motor Vehicles), Flushing, NY 11374; Rudolf Ardilla, (718) 966-6155
A00000

ZOAR Road Speedway, 15318 Armes Ct., Gowanda, NY 14070; David & Gordon Ackler, (716) 532-9463
A00000

NORTH CAROLINA

The Antique Barn, 2810 Forest Hills Rd., Wilson, NC 27893; Steve Seidlinger, (919) 237-6778
A00000

Badin Shore Raceway, 1730 Jackson Lake Rd., High Point, NC 27263; Jimmy or Tim Martin, (910) 431-6407
A00000

C/C Hobby Speedway, 8358 U.S. Hwy. 220 Bus. N., Randleman, NC 27317; Steve & Mary Cox, (910) 495-3482
A00000

C&H Raceway, 1400 N. Cannon Blvd., Kannapolis, NC 28083; Camera & Hobby Shop, (704) 933-5321
A00000

Cape Fear Speedway, 207 Harley Rd., Wilmington, NC 28401; Bob Justice, (910) 452-2354
A00000

Carolina Dragway, 907-D Warsaw Rd., Clinton, NC 28328; (910) 592-4569
A00000

Carolina Hobbies R/C Raceway, Route 1, Box 158, Taylorsville, NC 28681; Kim & Roseanne Kulawik, (704) 495-4040
A00000

Carolina Motorsports, 1517 Blandwood Dr., High Point, NC 27360; (910) 885-3713
A00000

Clapp's R/C Motor Speedway, Rt. 4, Box 300A, Siler City, NC 27344; Al Clapp, (919) 663-3198
A00000

Clinton R/C Raceway, 907-C Warsaw Rd., Clinton, NC 28328; Corbett Marshburn (919) 592-9489
A00000

Hobby Club R/C Raceway, 1241 Buck Jones Rd., Raleigh, NC 27606; Hobby Club, (919) 460-8838
A00000

King R/C, P.O. Box 897, Five Forks Village, King, NC 27021; Chris Smith, (910) 963-3969
A00000

King Super Speedway, 143 Industrial Dr., P.O. Box 897, King, NC 27021; Chris Smith, (910) 963-5598 or (910) 883-3969
A00000

Mine Hole Gap R/C Raceway, 1297 Charlotte Hwy., Asheville, NC 28730; Steve Shultz, (704) 628-3020
A00000

Ride & Slide R/C Raceway, 5319 Yacklin Rd., Fayetteville, NC 28303; Jim Woodman (910) 425-5276 or Bill Culbertson (910) 867-4202
A00000

R&J Off-Road Racing, 6172 Blalock Rd., Lucama, NC 27851; Robert Williams, (919) 239-0853 or Jonathan Jenkins, (919) 746-2703
A00000

R.J.S. R/C Parkway, Rt. 9, Box 651, John B. Carter Rd., Fayetteville, NC 28301; Tony Starling, (910) 486-4820
A00000

Rosewood R/C Speedway, 651 Community Dr., Goldsboro, NC 27530; Glenn Elam, (919) 731-4734
A00000

S&B Speedway & Hobbies, Rt. 1, Box 311A, Farmville, NC 27828; Ricky Strickland, (919) 753-4422
A00000

Sandhills Raceway Inc., US #1 South Aberdeen, NC 28315; (919) 944-7414
A00000

NORTH DAKOTA

Hacienda Hills Speedway, 20 Hacienda Hills, Minot, ND 58701; Kenny Duchscherer, (701) 839-4419
A00000

Minot Mini Racers, P.O. Box 415, Minot, ND 58702; Roger Lee, (701) 839-5294
A00000

Surrey International Raceway, RR 1, Box 37, Norwich, ND 58768; Marlen Lenton, (701) 728-6760
A00000

Valley Hobbies Inc., 2714 Main Ave., Fargo, ND 58103; Marshall Skare, (800) 493-9971
A00000

OHIO

Aerotech Raceway, 409 Apple Grove Rd., North Canton, OH 44720; (216) 499-1300
A00000

Classic Hobbies, 1994 E. Waterloo Rd., Akron, OH 44312; Walt Ellis, (216) 733-6400
A00000

C/R Hobbies and Raceway, 323 Center St., Ashtabula, OH 44004; Virginia Gagat, (216) 992-3833
A00000

CORCAR/Sams Club, 128 Amity Rd., Galloway, OH 43119-8732; Bill Stevenson, (614) 870-7159
A00000

D&J R/C Raceway, 801 W. Market St., Orrville, OH 44667; Don Yoder or Mark Nussbaum, (216) 682-4266
A00000

D&S Hobbies Raceway, 7701 Crile Rd., Concord, OH 44077; (216) 354-2112
A00000

Flag City Raceway, 3772 C.R. 18, Findlay, OH 45840; Ruth Hubbard, (419) 422-5589
A00000

Hobby World, 940 E. Main St., Ravenna, OH 44266; Thomas Fry, (216) 296-0894

JB Hobby & Raceway, 8760 St. Rt. 201, Tipp City, OH 45371; Bob Curtis, (513) 845-8222

Kent Hobby, 832 N. Mantua St., Kent, OH 44240; Bob Sabo, (216) 673-0422

Lafferty R/C Raceway, Box 153, 70228 Hurrah St., Lafferty, OH 43951; Chris Christman, (614) 968-4818

Lakes Hobbies and Speedway, 3425 Manchester Rd., Akron, OH 44319; Roy Spencer, (330) 645-6912

Medina R/C Raceway, 754 N. Court St., Medina, OH 44256; Bill Aholt, (216) 723-0255

Mid American Raceway, 13150 Airport Hwy., Swanton, OH 43558; Bill or Chuck, (419) 475-9459

Mr. T's R/C Super Speedway, 5540 CR 16, Wauseon, OH 43567; Nick Tinsler, (419) 335-3196

Performance R/C Club of Ohio, 2206 13th St. NE, Canton, OH 44705; Greg Ledbetter, (216) 453-7089

Scouters Hobby Hut, 234 Robbins Ave., #D, Niles, OH 44446; Dave "Scooter" Evans, (216) 544-9411

Steel Valley Hobbies & Raceway, 157 N. 4th St., Steubenville, OH 43952; William Northrop, (614) 282-3003

Van Wert R/C Raceway, 112 W. Main St. (above Tom's Donuts), Van Wert, OH 45891; Charlie Hire, (419) 239-4917

Y-City Hobby & Speedway, 120 S. 6th St., Zanesville, OH 43701; Kevin McKenna, (614) 455-3025

OKLAHOMA

Adams Creek R/C Speedway, 5207 S. 194th E. Ave., Broken Arrow, OK 74014; John Beighle, (918) 355-1416

Competition R/C, 190 SE 89th, Oklahoma City, OK 73149; James or Louise Brown, (405) 634-0809

Coweta Hobby & Speedway, 310 S. Broadway, Coweta, OK 74429; Derald Seabolt, (918) 486-3948

Off-Road Car Assoc. of Tulsa, 9720 Swan Dr., Broken Arrow, OK 74014; George Gooch, (918) 486-4528

Remote Control Race Course, 400 S. Vermont Ave., Suite 104, Oklahoma City, OK 73108; Rick or Steve, (405) 947-RACE

Wild Country Speedway, 127 South Main, Porter, OK 74454; Charles McCollough, (918) 685-0372 or (918) 687-1686

OREGON

Competition Racing Assoc., 17941 NE Gilsan, Portland, OR 97230; Mark Taylor, (503) 257-0796

Junior Vehicle Speedways, 3090 Starwood Ct., Medford, OR 97501; (503) 779-3090

Pit Stop Hobby, 634 N. Coast Hwy., Newport, OR 97365; Richard Wood, (503) 265-2825

R/C Plus Hobbies Raceway, 2029 25th St. SE, Salem, OR 97302-1130; Ron Smith, (503) 364-9188

R/C Speed Center, 2810 N. Pacific Hwy., Medford, OR 97501; (503) 779-8298

Yamhill County R/C Car Club, 722 Morgan Ln., McMinnville, OR 97128; Larry Rucker, (503) 472-7234

PENNSYLVANIA

A&D's Bumps & Jumps, RR7, Box 7395C, Stroudsburg, PA 18360; Dan Ambrosio, (717) 424-1750

Bachman's Speedway & Hobbies, Box 306, Effort, PA 18330-0306; Jeffrey Bachman, (610) 681-5845

Benders Junction Speedway, 2300 Benders Dr., Bath, PA 18014; Gerald Wambold Jr., (610) 759-0161

Brookville Hobby Shop, 170 Main St., Brookville, PA 15825; Mark Tonell, (814) 849-7385

CEB Motors R/C Div., 5743 Molly Pitcher Hwy., Marion, PA 17235; Charlie Boaze, (717) 375-4635

Clearfield R/C Car Club, P.O. Box 297, Clark Hill Rd., Hyde, PA 16843; Joe Welch, (814) 765-3045

Cressona Mall Speedway, Rt. 61, Pottsville, PA 17901; (717) 385-3506

DC Ultra Trax, 13 York Rd., Wycombe, PA 18974; David Cowan, (215) 672-5200

Dreamboat Hobbies, 2810 Pennsylvania Ave. W., Warren, PA 16365; Louie Dussia, (814) 723-8052

East St. Raceway, 736 E. Railroad Ave., Verona, PA 15147; (412) 826-0602

Hobby America Raceway, 5 Fitzsimmons St., Duke Center, PA 16729; Dan or Mike Coast, (814) 966-3765

Hobby House Raceway, Downingtown Marketplace, Downingtown, PA 19335; J.T. Nelson, (610) 269-1300

Koontz's Home & Hobby Center, 1205 Hoover St., Pittsburgh, PA 15204; (412) 331-3866

Kranzel's R/C Raceway & Hobbies, 415-B Bosler Ave., Lemoyne, PA 17043; David or Stuart Kranzel, (717) 737-7223

Lug Nut Raceway, Rt. 309 at Hartman Rd., Montgomeryville, PA 18936; Kathy Anderson, (215) 542-8250

Marshall's R/C Raceway, RR 4, Box 640, Honesdale, PA 18431; Bill or Dot Marshall, (717) 729-7458

The Mushroom Bowl, 812 W. Cypress St., Kennett Square, PA 19348; Joe, Bruce, or Drew, (610) 444-1850

Owens Race-A-Rama, RR 2, Box 98 F, Hunlock Creek, PA 18621; Rany Owens, (717) 477-3220

Pinion Twisters, 3M Plant, Green Ln. and Mitchell, Bristol, PA John (215) 632-9744, Bob (215) 945-0325

Pit Stop Hobbies, 262 W. Main St., Mount Joy, PA 17552; James Stoudt Jr., (717) 653-6222

Pro Challenge Raceways, Wycombe Ave. (P.O. Box 536), Lansdowne, PA 19050; Bob Paulavage and Don Fewkes, (610) 622-7651

Prop & Wheels Raceway, 139 W. Broad St., Tamaqua, PA 18252; Gil Walters, Prop & Wheels Hobbies, (717) 668-2288

RCO Raceway, 519 Broadway, Hanover, PA 17331; Chris Shaffer, (717) 633-9490

RACING TO BRING YOU THE BEST!

PROTOform

The "Aero-Revelation"

Let's face it: a lot of us would like to race full-size cars. You know: the kind you can sit in with your left hand at 10 o'clock, your right hand on the shifter and your right foot on the loud pedal. I daydream about dicing with Tommy Kendall and Ron Fellows at Elkhart Lake in my Trans Am Camaro or holeshotting John Force with my funny car in the final at the U.S. Nationals. Naturally, I would not only beat him, but I'd also blast both ends of the national record and spare all drag-racing fans of having to hear another inane post-race John Force

interview (at least, for that day). Here's another favorite daydream: it's lap 199 in the Daytona 500. I'm running a close third place in my PROTOform-sponsored, Hendricks-prepared Monte Carlo. It's now or never. After breaking out of the draft at the end of the back straight, I let my car drift high through turn three to keep the reys up. Marlin and Earnhardt are dead, even coming out of turn four; they can almost taste victory-lane's Gatorade. As they exchange tire marks, I dive low into the tri-oval and stick a fender out front just as we hit the finish line. Oh, yeah! What a feeling! My win means Earnhardt will have to wait another year!

I know. I know. You've got two small words for me, right?—Get real!

In addition to the thrill of competition, one of the great things about R/C racing is the many similarities between full-size race cars and our scaled-down versions. No matter which way you look at it, R/C cars are very fast, so we're forced to deal with the same set of dynamics as the big guys. You'll hear R/C racers talking about the same thing as the crew chiefs on a WC or CART team: horsepower, gear ratios, traction, suspension setup and aero balance. We at PROTOform are always searching for ways to create bodies that, like their full-size counterparts, have the optimum combination of downforce and as little aerodynamic drag as possible. In fact, R/C cars are probably more reliant on aero-

dynamic aids than full-size race-cars because their power-to-weight-to-speed ratios are much more radical (or ridiculous) than those of their full-size counterparts. Example: the typical 45-ounce, 6-cell, modified pan car (dependent on gearing) will run at 45 to 65mph. Scaled up to full size, that's a car with less than 10hp, weighing only 28 pounds racing at speeds of over 600mph! Now you know why these R/C cars try to fly—literally. It also explains why changes in body style (shape) and spoiler (wing) size and angles have such a pronounced



#1406 1996 Benz C-Class ITC

effect on drivability. So don't be afraid to experiment with your car's aero package. (More on that topic in the next column.)

Congratulations to Joel Johnson on his impressive 1/10-scale victory at the Worlds Warm-Up race at Revelation Raceway in Monclair, CA. Mark Pavidis was a surprise TQ in 1/10 scale. Both Mark and Joel used our P-35 body no. 1402, as did seven of the 10 drivers in the A-Main. The legendary Masami Hirotsuka TQ'd in 1/12 scale and went on to narrowly edge out Joel for the win. Again PROTOform's P-35 no. 1603L was dominant—the choice of the top nine finishers. Aiming to defend our title at the Worlds, we've released an all-new Peugeot 905B body. It has a variety of downforce configurations, like the all-conquering Group C and 24 Hours of Le Mans winner.

Congratulations to Josh Cyrul for his win at the ROAR 1/12-scale 4-cell Nats—the third leg in the Triple Crown. Josh edged out Mike Blackstock, the overall Triple Crown champ. A second-place finish clinched the "Masters" points title for Skip Starkey, and Walt Henderson won both the Nats and the Stock category points title. PROTOform was the choice of all four Triple Crown champs including the F1 titleist Wayne Vince.

New & Hot Protoform Body Styles!

- 1214 1997 Pontiac Grand Prix—regular (0.040) and light (0.030)
- 1303 1996 Monte Carlo (wide version)—regular (0.040) and light (0.030)
- 1511 "The Bomber" buggy body for the RC10B2 (with wing)—fits just right
- 1406* 1996 Benz C-Class ITC (DTM)—two wing sizes
- 1407 Peugeot 905B Group C (wide)—regular (0.030) and light (0.025)
- 1408* 1996 Audi A4 British Touring Car Championships (BTCC) with two wings

*Fits all Tamiya, Yokomo YR-4 and HPI RS4 (narrow)

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Pre-World Total Domination Results



This past April, in preparation for the 1996 IFMAR On-Road World Championships, Pro-Line/JACO attended the warm-up race held at the track where the Worlds are being held—Revelation Raceway in Monclair, CA. Drivers from all over the United States, Europe and Asia competed for two gruelling days in 1/10 and 1/12 scale to determine who would have the inside line going into the Worlds. When the (tire) dust had cleared, one fact became painfully obvious to the competition: Pro-Line/JACO is the dominant force in on-road racing! All the 1/10-scale A-Main drivers ran Pro-Line/JACO and eight out of 10 1/12-scale A-Main drivers chose the superior traction of Pro-Line/JACO foam tires.

- **1/10-scale winner**—Joel Johnson (Team Trinity): white rears (part no. 2144), Pink fronts (2124).
- **1/10-scale Top qualifier (TQ)**—Mark Pavidis (Team Associated/Reedy)—Pink rears (2142), Pink fronts (2124).
- **1/12-scale winner and TQ**—Masami Hirotsaka (Team Yokomo/Associated/Reedy)—Pink rears (2342), Purple fronts (2325).

Helpful Hint #4

When you race outdoors—on a track or a parking lot—you should be prepared for changes in temperature, track conditions, etc. Unfortunately, to be totally prepared, you would need a few pairs of tires in every compound. Fortunately, there's now a tire that works well in almost every situation: Gold fronts (2122) and Gold rears (2141). Gold dot tires work especially well on dirty and dusty surfaces, such as parking lots and streets. So if you're having trouble with traction, try a set of Golds.

Good luck! See you in the winners' circle!

RACING TO BRING YOU THE BEST!

P.O. Box 456, Beaumont, CA 92223;
(909) 849-9781; fax (909) 849-2968

Riverside Raceway, PA Ave. W & Hickory, Warren, PA 16365; Jeff, (814) 723-4211

ACCESSION

Rolling Wheels R/C Raceway, Westhill Shopping Center, Coraopolis, PA 15108; Peg, (412) 262-4858

ACCESSION

Road Runner Raceway, 1027 E. 7th St., Bloomsburg, PA 17815; John, (717) 784-1260

ACCESSION

S.A. Hi Banks, Hahn's Dairy Rd., Palmerton, PA 18071; Scott Andrews, (610) 377-6123

ACCESSION

Sinking Spring Race Center, 237 South Hill St., Sinking Spring, PA 19608; Randy Gelsinger, (610) 670-0760

ACCESSION

Staub Bros. R/C Speedway, 31 Locust St., Gettysburg, PA 17325; Todd or Scott Staub, (717) 334-5445

ACCESSION

T-N-T Raceway, Randolph Rd., Great Bend, PA 18821; Ed Kraft, Rd. 1 Box 199C, Hallstead, PA 18821, (717) 967-2604 or Franchie (807) 775-1756

ACCESSION

Wagonhill Hobbies, 967 New Castle Rd., Rt. 422, Butler, PA 16001; Jeff Hyatt, (412) 865-9877

ACCESSION

Willow Mill Speedway, 37 N. Season's Dr., Dillsburg, PA 17019; George Verbowitz, (717) 432-4445

ACCESSION

Willow Run R/C Raceway, 135 Wright St., Corry, PA 16407; Jim Small, (814) 664-8147

ACCESSION

PUERTO RICO

Dorado Offroad R/C Track, Pista Atletica Bo. Higüillar, Dorado, Puerto Rico 00646; Roberto Lamoso/Jaime Ramos, (809) 796-5603 or (809) 796-1734

ACCESSION

Hacienda Muñoz R/C Track, Carr. #14, Juana Diaz, PR 00795; (809) 837-7083

ACCESSION

RHODE ISLAND

Rhode Runner Raceway, 20 State St., Bristol, RI 02809; Bill or Betsy, (401) 254-0409

ACCESSION

SK Hobbies Inc., 15 Carl St., Johnston, RI 02919; Slim or Keith, (401) 453-1440

ACCESSION

Tri-State R/C Raceway, 205 Hallene Rd., Warwick, RI 02886; Raymond Dean, (401) 738-4908

ACCESSION

SOUTH CAROLINA

The Great Escape, 105 Franklin Ave., Spartanburg, SC 29301; Jonathan Bowen, (803) 574-5273

ACCESSION

Hobbies and More, 1570 S. Main St., Darlington, SC 29532; Jerry Pollard, (803) 393-0355

ACCESSION

J&M R/C Hobbies, 5341 Dorchester Rd., Evanston Plaza, N. Charleston, SC 29418; Mike Smith, (803) 552-9449

ACCESSION

ORA Atomic Racing Facility, 373 Boyd Pond Rd., Aiken, SC 29803; Bill Jackson, (706) 855-0846 or (803) 642-0314

ACCESSION

Racer's Choice Remote Control, 4014 Fernand Rd., Piney Grove Shopping Center., Columbia, SC 29212; Clifford McLinden, (803) 561-0000

ACCESSION

World Hobbies, 707 Sulphur springs Rd., Greenville, SC 29611; Bob Pittman, (803) 246-4702 (Closed after 4:00 pm Mondays)

ACCESSION

SOUTH DAKOTA

Action R/C Raceway, 107 N. Main, Mitchell, SD 57301; (605) 996-6895

ACCESSION

Dakota Off-Road Racers, 2989 W. Br. Co. 12, Aberdeen, SD 57401; (605) 226-0604

ACCESSION

TENNESSEE

Cumberland Valley Raceway, P.O. Box 233, Ashland City, TN 30715; Jamie Pate, (615) 792-4371, ext. 1195

ACCESSION

D&M's Downtown Raceway, 2703 US Hwy. 411S, Maryville, TN 37303; (615) 681-8919

ACCESSION

Lawson Raceway, 152 Joel Rd., Oliver Springs, TN 37840; Anthony Lawson, (615) 995-9351

ACCESSION

Machine-Head Straits, 938 Grandmere Rd., Lawrenceburg, TN 38464; Larry and Eliane Sanders, (615) 762-6630

ACCESSION

MSA R/C Racing, Rt. 12 Box 489 B, Crossville, TN 38555; D.R. Findley, (615) 456-0027

ACCESSION

Robertson's R/C Raceway, 175 Seavers Rd., Jackson, TN 38301; Travis Robertson, (901) 424-6423

ACCESSION

Sparta Raceway Park, 32 N. Main St., Sparta, TN 38583; Carl (Buddy) Elrod, Rt. 5 Box #652, Sparta, TN 38583, (615) 836-8450 or (615) 761-3407

ACCESSION

Tri-County R/C Raceway, 919 Little Dogwood, 1312 Kingston Hwy., Kingston, TN 37763; Dwayne Romine, Kyle Romine, (615) 376-2330, 376-9955

ACCESSION

TEXAS

AA Raceway, 1617 Foomey Rd., Austin, TX 78704; Wolf Gumfory, (512) 474-8277

ACCESSION

Big Mike's R/C Raceway, 1405 W. Cotton St. (behind the Locker Room), Longview, TX 75604; (903) 297-7814

ACCESSION

Eastex Raceway, 45000 Hwy. 59 N., New Caney, TX 77357; Tom Keller, (713) 399-9777

ACCESSION

Flip & Spin R/C, 5957 Jones Rd., Bryan, TX 77807; Garland Crabb, (409) 822-7311

ACCESSION

Hai's Hobby Raceway, 1440 Bessmer, El Paso, TX 79936; (915) 591-2213

ACCESSION

The Hobby Center Raceway, 14104 Stan Schiveler Loop, Suite 1, Killeen, TX 76543; Lawrence Remick, (817) 690-7311

ACCESSION

Hobbycraft Speedway, 819 N. Main St., Corsicana, TX 75110; Keith Hoffman, (903) 872-6761

ACCESSION

Hobbytown USA, 7516 FM 1960 W., Houston, TX 77070; Fred Platman, (713) 955-7097

ACCESSION

Hobbytown USA, 999 E. Basse Rd., Suite 177, San Antonio, TX 78209; Joe Sena or Clark Baisden, (210) 829-8697; fax (210) 829-8707

ACCESSION

Houston R/C Hobbies, 6338 Skyline Dr., Houston, TX 77057; Lynn Cramer, (713) 266-6006

ACCESSION

Indy R/C World, 220 Mesquite Village, Mesquite, TX 75150; (214) 271-4844

ACCESSION

Keyser's Hobbies, 1643 Texas, College Station, TX 77840; Bill Bennett (409) 693-8095

ACCESSION

North Houston Speedway, 11847 Spears Rd., Houston, TX 77067; Bob or Carol Hillin, (713) 872-2471

ACCESSION

Performance Raceway, 1106C Witte Rd., Houston, TX 77055; Frosty Sinclair or Richard Oliver, (713) 464-4458

ACCESSION

Playlit R/C Raceway, 3518 W. Loop 306, P.O. Box 5245, San Angelo, TX 76902; Sammee Favre, (915) 942-6469

ACCESSION

Rivercity Speedway, 11731 Wetmore, San Antonio, TX 78247; Ralph Hernandez, (210) 359-6870; Joe Toledo, (210) 341-5652

ACCESSION

Rough Country, 905 Jacksboro Hwy., Wichita Falls, TX 76301-5310; Robert Kerr, (817) 322-2453

ACCESSION

Star/Car Raceway, 5802 Patton St., Corpus Christi, TX 78415; Mike Hellums, (512) 289-0066; Race Hotline, (512) 881-6105

ACCESSION

T&T Eagle, 161 W. Spring Creek Pkwy., #601, Plano, TX 75023; Tony Welborn, (214) 517-0562

ACCESSION

Texas Speedway, 6707 Chimney Rock, Bellaire, TX 77401

ACCESSION

T.O. Offroad Raceway, 6236 Quail, El Paso, TX 79924; Eren Saenz, (915) 821-7522

ACCESSION

Wild Bill's Raceway, 535 E. Shady Grove, Irving, TX 75060; Lynn Morgan or Jerry Williams, (214) 438-9224

ACCESSION

UTAH

Fastrax, 205 N. Carbon Ave., Price, UT 84501; Dave Johnson, (801) 637-6803

ACCESSION

Intermountain R/C Raceway, 8481 W. 2700 S., Magna, UT 84044; David Mott, (801) 250-8303

ACCESSION

WOR Raceway, 3170 Brinker Ave., Ogden, UT 84401; Brian Worton, (801) 393-2530

ACCESSION

VERMONT

Bradford R/C Racing, Main St., Bradford, VT 05033; Seth Bean, (802) 222-9674

ACCESSION

Stoughton Pond Raceway, Stoughton Pond Rd., Perkinsville, VT 05151; Rick Adams, (802) 263-9321

ACCESSION

VIRGINIA

Bob's Hobbies & Raceway, 910-J Brandy Creek Dr., Mechanicsville, VA 23111; Bob Wagner, (804) 746-2758

ACCESSION

Cooper's R/C Raceway, Rt. 4, Box 1228, Chatham, VA 24531; (804) 724-4182

ACCESSION

Fairstone R/C Speedway, Rt. 4, Box 918, SR635 Goblintown, Stuart, VA 24171; Pat Moon Jr., (540) 930-3984

ACCESSION

Hobby Hangers Speedway, 4433 A, Brookfield Corp. Dr., Chantilly, VA 22021; Mark or Billy, (703) 631-8820

ACCESSION

KEY TO SYMBOLS

- Indoor
- Outdoor
- Off-road
- Oval
- Dirt oval
- Carpet
- Concrete
- Asphalt
- On-site hobby shop
- AC power
- Auto lap-counting
- Food available

PRO-LINE TRACK DIRECTORY

The Hobby House, 116 Edds Ln., Sterling, VA 20165; Ron Beckman, (703) 444-0333

KC's Radio Control & Repair, Rt. 4, Box 312, Trents Ferry Rd., Lynchburg, VA 24503; Curtis or Kim Wright, (804) 384-8596

Olde Towne Hobby Shoppe, 9105 Center St., Manassas, VA 22110; Arnie Levine, (703) 369-1197

Roadmasters/Rick's Hobbies, 12201 Balls Ford Ave., Manassas, VA 22110; Rick, (703) 330-6833

Shamrock Raceway, P.O. Box 3739, Winchester, VA 22601; Kevin Allen, (703) 662-0403

Tracks Hobbies, 1920 E. Pembroke Ave., Hampton, VA 23663; Rick Cardwell or Tom Gunther, (804) 723-4170

WASHINGTON

Alfie's, 108 South K St., Aberdeen, WA 98520; (206) 533-6638

Burien Toyota R/C, 15025 1st Ave. South, Seattle, WA 98148; Ray Meek, (800) 654-6456

Four Season R/C Racing, 2941 Sleater Kinney Rd. NE, Olympia, WA 98506; Gary & Sharon Brown, (360) 491-2430

Hale's R/C Raceway Park, 10611 136th St. E. Puyallup, WA 98374; Wait Hale, (206) 845-7675

Home Town Hobby, 116 N. Main Ave., Ridgefield, WA 98642; (206) 887-1769

Jim's Wings & Wheels Raceway, 1827 S. Washington, Kennewick, WA 99337; (509) 586-7420

L&L R/C Raceway, 15818 S.E. 287th, Kent, WA 98042; Bob Lewis, (206) 631-1664

Raceway Hobbies, 188 Sanset Ave., S. Edmonds, WA 98020; Brian or Bradt, (206) 774-3285

Rattlesnake R/C & Raceway, Brag T-121 Big Pasco, Pasco, WA 99301; Bill Brandt, (509) 545-4495

Schmidt's Auto Parts, 10305 Old Hwy. 99, Marysville, WA 98271; Jon Faila, (206) 653-8838

Spokane Indoor Raceway, 6422 E. 2nd Ave., Spokane, WA 99212; Dave Matson, (509) 534-RACE

Tacoma R/C Raceway Hobbies, 6305 6th Ave., Tacoma, WA 98406; Neil Bader, (206) 565-1935

Terror Raceway, 8012 S. Tacoma Way, Tacoma, WA 98499; Dave Kleinman, (206) 584-8859

WASHINGTON, D.C.

BAFB R/CAR, Bolling Air Force Base, Washington, D.C. 20332; Charles Leadbetter, (301) 297-4524

WEST VIRGINIA

Burn-Fab Raceway, 90 Davis St., West Union, WV, 26456; Mark Travis, (304) 873-2487

Fulton's R/C Raceway, 2646 Chapline St., Wheeling, WV 26003; James Fulton, (304) 233-5355

Left Turn Hobbies, 100 Saco Ln. (by Post Office), Glen White, WV 25849; Stretch, (304) 255-3930

WISCONSIN

ABC R/C, 244 W. Main St., Waukesha, WI 53186; Dick, (414) 542-1245

Bayland Hobbies, 9510 Ashwaubenon, Green Bay, WI 54304; Dan or Jay Boettge, (414) 339-8288

JJ's Dirt Heaven, 6028 County Road K, Champion, WI 54229; Jim or Jeff Jansen, (414) 866-9096

Mid-West Tri-Clone, 3745 Shuster, West Bend, WI 53095; Tom Holz, (414) 334-0429

NARCAR Raceway, 4331 E. Wall St., Eagle River, WI 54521; Mary O'Brien, (715) 479-5154

S&N's Tracks Hobbies and Raceway, 6045 N. Green Bay Ave., Milwaukee, WI 53209; Scott Ernst, (414) 351-1910

Sparta R/C Raceway, R&S, Sparta, WI 54656; Eric Johnson, (608) 269-6613

WYOMING

Collectible Creations Off-Road Oval Track, 1790 Dell Range Blvd., Cheyenne, WY 82009; Phil Severson, (307) 632-2156

ARGENTINA

Club A. Velez Sarsfield, Av. J.B. Justo 9000, C.P. 1408, Buenos Aires; Jorge Herrero, 54-01-685-5851

AUSTRALIA

Aubry R/C Car Club, Aubry Showgrounds, Aubry, NSW 2640; Ron Langman, 060-247-128

Canberra Off-Road Model Car Club, Goyder St., Narrabundah, ACT 2604; Graham Brown, 61-6-241-3070

Central Coast ORCC, EDSACC Sports Complex, Bateau Bay, N.S.W. Australia 2261; Peter McKnight, 011-61-43-693-698

Illawarra RECCC, Croome Sporting Complex, Albion Park Rail, NSW 2527; Mel or Andrew, 042-714-683

Lakeside R/C Racing Car Club, Hollywood Dr., Lansvale, NSW 2166; R. Bartolozzi, 62-2-907-9800

Wodonga R/C Car Club, 11 Murphy St., Wodonga, VIC 3690; Ron Langman, 011-6160-247-128

BELGIUM

ATR-Alka-Tele-Racing, 3570 Stationstraat 21, Aiken Limburg; 0032-11-25-49-03

Cartroubles Indoor Buggy Track, Jan Moonsstraat 52-56, 2160 Wommelgem, Belgium; Guy Ermes, 32-3-326-51-15; fax, 32-3-326-51-01

M.B.V. Parc de Reist, Tenierslaan, 28, B1910 Kampenhout, Belgium; Frank Mostrey, fax (32) 0-16657518

MBV-Kampenhout, Tenierslaan 28, Kampenhout B1910, Belgium; Frank Mostrey, phone and fax (0) 16-65-75-18

MRCZ, Centrum, De Burg, Belgium; Montie, 75-71-63

Model Racing Club Oudenaarde, Scheldekant, 9700 Oudenaarde, Belgium; A. Chanterine, 32-55-31-36-48; fax, 32-55-30-19-12

BRAZIL

Brasilia R/C Motor Circuit, Estacionamento do Estadio Mane Guarrinch, Brasilia, DF 70000, Brazil; Alexandre (Alex), 55-061-273-7205

Hobby Center, SCS 210 BLH Apt. 204, Brasilia, DF-Brasil 70.273; 061-242-0488

Jungle Drive, Rua Alberto Maranhao, No. 219 Icha do Gov. Rio de Janeiro, 21940-490; Paulo Brito, (021) 396-0851 or (021) 393-7449

MP Raceway, AV. Nacoes Unidas, 6815 Lapa, Sao Paulo; Gerd Heitrotter, 55-11-9819039

Off Roaders, Av. Guilherme Dummont Villars, 317, Sao Paulo, CEP 05640; Waldir Ielpo, (055) 011-260-5628; fax (055) 011-831-4931

Way of R/C Off-Road Cerrado, Rua Pariba 1323, 1st floor, Belo Horizonte, Minas Gerais; Claudio T. Correa, (031) 227-6111, fax (031) 227-6869

CANADA

Action Weet, 462 Turcotte, Vanier, Quebec, G1M 1R6; Regent Tardif, (418) 527-5756

A&J Toronto R/C Raceway, 24 Main St., Building B, Unionville, Ontario L3R 2E4; (905) 305-1479

ATN, Auto Teleguide Nicolet, 2000 Rue Paul Hubert, Saint-Jean-Baptiste-de-Nicolet, Quebec J3T 1E5; Louis Durand, (819) 293-6097

Auto Sprint, 6065 Des Grands Prairies, St. Leonard, Quebec H3G 2R6; David Kalayjian, (514) 287-3503

Circuit Peps, Centre de Location, 37 du Roi, Sorel, Quebec; (514) 746-8828

Circuit Plessis, 260 Rang 9 Ouest, Plessisville, Quebec G6L 2Y2; (819) 362-3743

Circuit R/C Pro, 1500 Chemin Sullivan, Val d'Or, Quebec, J9P 1M1; R/C Modele Plus, (819) 874-3938

Circuit Teleguide St. Roch, 363-B St. Charles, St. Roch de L'achigan, Quebec J0K 3H0; (514) 588-4254, fax (514) 588-6554

Club Avall, 244 Jules-Richard, Deauville, Quebec J1N 3M2; Daniel Vanier (819) 864-6262

Club RCST, 44 Rue Holliday, Sept-Iles, Quebec G4R; Sylvio Gerard (418) 968-6575; hobby shop (418) 962-6565

CRCC, Box 309, Clinton, Ontario N0M 1L0; Eric Russell (519) 482-9429

Ducksters R/C Raceway, carson Pit Road, Quensel, BC V2J 4B1; Darrel Dinsdale, (604) 747-2680

Dynamic Hobbies, 21 Concourse Gate, Unit 6, Nepean, Ontario K2E7S4; Clark Freeman, (613) 225-9634

East Coast Model Center Raceway, 13 Glen Stewart Dr., Suite 1, Southport, Prince Edward Island C1A 8X9; Gary Stephen, (902) 569-3262

Evolution Speedway, 1935 Glengrove Rd., Pickering, Ontario L1V 1X3; Eric Lang, (905) 839-2084

Fast-Trax Speedway, RR 4, Trenton, Ontario; Russ McPeak, (613) 394-6411

Fly 'N' Bryan's Radical Raceway & Little Shop of Hobbies, RR #1, Site 12, Comp. 49, Chase, British Columbia, Canada V0E 1M0; Bryan Coffey/ Dani Polvin, (604) 955-0669

Honda House Motor Speedway, 384 Richmond St., Chatham, Ontario N7M 1P9; John Elliot, (519) 354-5530

Interior R/C Raceway, 34-1605 Summit Dr., Kamloops, BC, V2E 2A5; Martin Vanhewenhuizen, (604) 374-1268, (604) 374-8458

J-T International Raceway, 127 Milligan Lane, Napanee, Ontario K7R 8A1; N. O'Neill, (613) 354-0099

Mid-Canada R/C Speedway, 1678 St. James St., Winnipeg, Manitoba R3H 0L3; Richard Driedger, (204) 339-6566

Minutaires & Passions, 204 St. Charles, #103, Ste. Therese, Quebec, Canada J7E 2B4; Gilles Lachance, (514) 979-7989

MORRAC Raceway, 5449 Crowchild Tr. SW, Box 36060, Calgary, Alberta T3E 7C8; (403) 254-1386

Off-Road R/C Raceway, 76 Eddystone Ave., North York, Ontario M3N 1H4; Ron Lefebvre, (416) 740-0536

Off-Road R/C Raceway, 76 Eddystone Ave., North York, Ontario M3N 1H4; Ron Lefebvre, (416) 740-0536

Prince George Radio Controlled Car Club, 202 Explorer Cres., Prince George, B.C. Y2M5R8; Doug Waller, (604) 581-0035

Quintrax Speedway, 610 Dundas St. East, Belleville, Ontario K7K 2M1; (613) 962-1414; fax (613) 962-7306

Randy Shantz Raceway, 1015 W. 14th St., North Vancouver, British Columbia; Steve Muhlali, (604) 945-3888

RC World, 7070 Haldibrook Rd., RR #1, Caledonia, Ontario N3W 2G8; Don Nicholls (905) 679-3177 or Keith Seguin (905) 388-9855

Recreation R/C Raceway, Hwy 16 and Ferry Ave., Prince George, BC; Doug Waller, (604) 561-0035

Ronbo's R/C Racing, RR 1 Glen Walter, Cornwall, Ontario K6H 3G4; Ron Giroux, (613) 936-0176

Rousillon Hobby Track, 177-D St-Jean Baptiste, Chateauguay, Quebec J6K 3B4; (514) 698-2151

Sheldon's Raceway, Box 597, Gutknife, Saskatchewan; Sheldon Bradton, 398-2232

Spinnin Wheel Raceway, RR 1, Ariss, Ontario N0B 1B0; (519) 824-1614

South Okanagan Roadhogs, Skha Lake Rd., Penticton, BC; Willie Lerm, (604) 492-5698

Strathclair Park, Old Garden River Rd., Sault Ste. Marie, Ontario P6A 5T1; (705) 759-1855

Sudbury Organized Auto Racing, 765 Barrydowne Rd., Sudbury, Ontario P3A 3T6; Ken Moore, (705) 524-5339

Thunder Alley Raceway, Lambton Mall, 1380 London Rd., Sarnia, Ontario N7S 1P8; Rob Smith, (519) 882-3361

Vancouver R/C Road Racers, #100-2733 Barney Hwy., Coquitlam, British Columbia V3E1K9; Roger Brown, (604) 945-3888

COLUMBIA

Club De Automodelismo Colombiano, Centro Recreativo Cafam, Kilometro 14 Autopista Norte, Santafe de Bogota, D.C. Colombia; Jorge Delgado, 1-6130588

Club De Automodelismo Colombiano, Centro Comercial Guaymaral, Kilometro 16 Autopista Norte, Santafe de Bogota, D.C. Colombia; Jorge Delgado, 1-6130588

Garoso Raceway, Avenida Libertadores con Diagonal Gran Colombia, Cucuta, Colombia; Gabriel Rodriguez, 975-751892

CYPRUS

Racing Model Club, Kennedy Ave. N. 42 Nicosia, Cyprus; Andrea Sotiriou, 493186; fax 493229

DENMARK

Brondby Motor Club, Roskildevejs 460 Rodovre, Denmark 2610; Soren By Holst, 011-45-31-472-462

Holstebro R/C Buggy Club, Mozartsvej 7500 Holstebro, Denmark 2600; Michael Brusholt, 011-45-97-412-734

Klub 144 Raceway, Bagsvaerdvej 144A, 2800 Lyngby, Denmark; Henrik Carstensen, 45-42-88-3691

Rainbow Raceway, Eriksvej 9 Glostrup, Copenhagen 2600; P. Christiansen, 011-45-52-848-504

Thor Minirace Odense, Sohusevej 255, Allose, Odense, Behind Alessio Hallen (Sport Centre), Odense, Denmark; Ulrich Rasmussen, 011-45-65-303-707

DOMINICAN REP.

Afoca R/C Speedway, Feria ganadera, Santo Domingo; (809) 220-5266

La Barranquilla R/C International Speedway, Santiago; (809) 582-2303

ECUADOR

Hobby Centro A.C.R.O. Club, Via a Turi Km 0.5, Cuenca-Ecuador; Teddy Jaramilla, 593-7-831-289; fax 593-7-817082

ENGLAND

Chessington Radio Car Club, Surbiton Sport Club, Riverhill Estate, Worcester Park Rd., Worcester Park, Surrey, England; Ian Spiller, 0252-20657

Hinkley RCCC, Three Pots Inn, A5 Wathing St., Hinkley, Leicestershire UK; Bruce, 01455-890580

FRANCE

Auto Electron, 35, rue B. de Ventadour, Limoges, France 87000; M. Boudoul, 55 062763

Crame Roncq, 64 rue du Becquerel, 59370 Mons el Baroeul, France; Michael Hondekyn, (33) 20042755

Lorgies Bolides, rue Beau-Riz, 62840 Lorgies, France; Mme. Hourdequin Sabine

GERMANY

Dreykorn Raceway, Heuchlinger-Hauptstr. 43, Lauf, 91207; Hermann Hensel, 09123-81457

MC Koln, Bottergerstr., Worringen, Germany 50769; Ralf Habel, 02733-477493

Mini Car Club Dortmund, Kortschstr. 4, 4600 Dortmund 13, Germany; Roland Schwan, 0231/213609

Oberhausen-Altstadt, Am Fesder-
turn., Oberhausen, Germany 46099;
Josef Holl, 0208-403676

Panik Raceway, Teutonen Str. 5,
Jroisdorf, Germany 53844; Guido
Kraft, 0224-400259

Stoppelhopper Oberhausen,
Niebuhrstr., Oberhausen, Germany
46049; Matthias Reckward, 02801-1545

GUAM

R/C International Raceway, P.O. Box
GK, Agaña, Robert (Buddy) Simpkins,
(671) 477-3207

HONDURAS

Autodromo Accion, Quinta Santa
Maria, San Pedro Sula, Honduras,
Colonía Rivera Hernandez; Eduardo
Hondal, (504) 52-2061

HONG KONG

H.K.R.C. Model Car Racing Club, Lot
2130-2137, Ko Po Tsuen, Sha Tau Kok
Rd., N.T., Hong Kong; Alex Chan, (852)
659-2822

Kingsville Buggy Arena, Wong Chuk
Yeung Village, Shatin, N.T.; Pak Yeung,
(852) 607-0826

INDONESIA

Cipaku Indah Speedway, Jl Cipaku
Indah II/2, Bandung 40143, Indonesia;
Cipaku Indah Hotel, Brad Lake, 011-
62-22-210219

Everly's Racing, Palm St., 188,
Surabaya, Jatim, Indonesia; Jhon
Mudik, 011-62-31-595-888

Pondok Cabe Circuit, Jl. Kunir No. 83,
Pondok Cabe, Ciputat, Jakarta,
Indonesia; Ali Agus Salim, 7403568-9;
fax 7491533

ISRAEL

Irca Off-Road, Rahanana, Israel;
Yaron Zafiris, (972) 030549937

Nahshoneat, Abba Nilel Silver Str. 64,
Haifa, Israel 32809; Golan Levy, (972)
039386444 or (972) 04231252

ITALY

Associazione Modellisti Cossato, via
P. Maffei, Cossato 13014, Biella, Italy;
Zanellato Romildo, 015-405881; fax
015-922709

JAPAN

Courtney Off-Road, Camp S.D. Butler,
Okinawa, Japan, FPO AP 96379; USMC
Arts & Crafts, 011-81-61173-53674

Foster R/C Raceway, Camp S.D.
Butler, Okinawa, Japan, FPO AP 96379;
Camp Foster Arts & Crafts, 011-81-
61173-53674

Hansen Off-Road, Camp S.D. Butler,
Okinawa, Japan, FPO AP 96379; USMC
Arts & Crafts, 011-81-61173-53674

Iwakuni R/C Track, PSC 561, Box 978,
FPO AP 96310-0978; David T. Eck,
011-81-61173-53662

Misawa R/C Raceway, PSC 76, Box
2946, APO AP 96139-2946; Terry
Branchau, (011) 81176535181 ext.
222-5324

Yokota R/C Racers, PSC #78, Box
3619, APO AP 96326, Tokyo, Japan;
Victor Giles, 011-81-0425-52-2511 ext
225-9025

Zama Off-Road Raceway, 17th
ASGCM Unit 45013, Box 3232, APO
AP 96338, Japan; SFC Ken Campbell,
011-81-3117-63-8478

LEBANON

Wild Willy R/C, Oscar St-Jal Eddie,
Beirut, Lebanon; 00961-1-403751

MEXICO

Alces Off Road, Lopez Mateos y
Rayod S/N, Ensenada, Baja California,
BC 22830; Jorge Bustamante, (667) 6-
1476, 61477, 86729

Baja Jr., H. Valdez 151 Pte. Y Gmo.
Prieto, Los Mochis Sinaloa 81200;
Memo Asencio, Gabry Macias, 681-
20276; fax, 681-26430

Club Kyosho de Automodelismo
Departino, Av. Pacifico 216 Coyacan;
Ajusco-Toluca Km 15.3 DE, Mexico
04330, Ing. Jorge Perez Holder, (525)
544-08096; fax, (525) 544-7133

Hobby Centro, 12 De Diciembre No.
3070-A, Guadalajara, JAL 45550;
Alejandro Ortiz Del Toro, (36) 21-46-28

Hobby's Formula, Au observatorio 457
DF 01120; (905) 502-3620

Hobby Model's Raceway, Blvd. Garcia
de Leon, 1555, Morelia, Michoacan
58260; (431) 5-01-22

Jaguar R/C Club, Calz. Zavaleta 116,
Puebla 72150; Chema, Denise or
Chiro, (22) 31-00-91, (22) 33-00-94

La Hielera, Prol Corregidora Nte 350,
Queretaro, QRO C P 76160; Jorge
Morelos Rabell, (42) 12-15-25

Pista Casino, Hotel Casino de la Selva,
Cuernavaca, Morelos 16507; Luis
Duhart, (73) 19-12-38

R/C Racing Club, Obsidiana #2900,
Zapopan, Jalisco 44560; Fernando
Hernandez, (3) 616-73-47

Tony's Track, Oregon 364 Sur,
Culicán Sinaloa; Guillermo Prieto, (67)
165708-168141

NETHERLANDS

H.F.C.C. Hollandia, De Werf 60, The
Hague, The Netherlands; G. de Jong,
031-070-3679820

NEW ZEALAND

Capital Model Racers, Avalon, Lower
Hutt, New Zealand; Roger Whitmarsh,
04-566-5714

Counties R/C Raceway, Pukekohe
Showgrounds, Station Rd., Pukekohe,
New Zealand; R. Northcott, 09 23
86904

Harewood Radio Control Car Club,
550 Sawyers Arms Rd., Christ Church,
New Zealand; Dean Johnson, 09 03
3880 344

M.A.C. Vlymen, Hendriklaan 6,
Vlymen, Netherlands; Ju Kasteren, 011
31 73 517906

Papakura Indoor R/C Car Club, 25
Tainere Cres., Papakura, Auckland;
Colin Perry, (09) 298-4711

Western District R/C Off-Road Car
Club, CNV Bancroft/Akatea Drive,
Auckland; Chris, (09) 838-5201

NORWAY

Aurskog R/C Club, Aursmoen, 1930
Aurskog, Norway; Tommy Gjeleseth,
47-63-86-21-61

Dalen Raceway, P.B. 728, 6401 Molde,
Norway; Johnny Reitan, 94 64 52 95

Hadeland Raceway, 2750 Gran, Gran
Norway; Dag Bakke-Nilsen, 61330405

Store-Baller Raceway, 2750
Gran, Gran Norway; Ola Raastad,
61330225

PHILIPPINES

Boyet R/C Hobby Shop, Unit No. 10
Lucas Commercial Center, Marcos
Hiway, Augustamot, Antipolo, Rizal;
Jose "Boy" Chua, 721-2555

Philippine F1/Touring Club, Super Mail
I, EDSA, Quezon City 1156; Raymond
Aguilar/ Ron Villalor, 896-64-15/23-
30-08

Philippine R/C Association, B.F.
Homes Paranaque, Metro Manila 1700;
Ronald/Manny Villalor, 23-30-08

Quezon City Radio Control Club,
Quezon City Memorial Cir., Quezon
City; Benjie Lumanlan, 731-94-53

PORTUGAL

Aero Clube da Madeira, Rua do
Castanheiro E-2, Funchal, Madeira,
Portugal; fax, 091-221265

SOUTH AFRICA

Banana County R/C Racing Club, P.O.
Box 988, Margate, 4275; Dennis
Steenmans, 27 (0) 391-20975

Gordons Bay R/C Club (GBRC),
Andrew Norman Sports Centre,
Gordons Bay, Cape Province; Andre
Hollander, 024-512865

Helderberg Radio Control Car Club,
De Beers Soccer Club, De Beers Ave.
Somerset West, Cape Province; Andre
Hollander, (024) 51-2865

Lowveld Radio Control
Thunderdome, Lion's C;ub
Kanyamazne Rd., Nelspruit, Eastern
Transvaal; Martin Van Der Merwe,
(01311) 534-6415

Parow Radio Car Club, Northern
Sports Complex, Parow, Cape Province;
Stirling Spengler, (021) 945-4957

Phoenix Raceway, 11 Tugela St.,
Stilfontein, Transvaal; Lionel Edwards,
(018) 4842863

Pietersburg Model Racing, Landros
Marais St., Pietersburg, Northern
Transvaal; Peter Van Vuuren, (0152)
293-0700

R.C. Superbowl, Elsburg Sports
Grounds, Elsburg, Johannesburg; Karl
Fawcett, 27119076145

R.A.C.E. Off Road, Cecil Payne
Stadium, Maraisburg, Gauteng; Derrick
Plank, (011) 682-2173

Rustenburg Off-Roaders, Olympia
Stadium, Rustenberg, Northwest
Province; Jan Van Vollenhoven, (0142)
24-846

Pretoria Off Road R/C Club, Joost
Bekker Caravan Park, Augustville,
Pretoria, Gauteng; Gert Swart, (012)
377-3238

SPAIN

ADAM, Mina Flores de la Sienna,
Madrid, Spain Alvaro Sarabia, 01-
7471113

A.D. Diabliños, Morata De Jalon,
50.260 Zaragoza, Spain; Juan Carlos
Vicente de Vera, 34-76-605350

Club Modelismo Catilla, P.O. Box 491,
Burgos, Spain 09080; A.J. Pereda,
011-34-47-240130

Club Social Sevillana, Crta. Pullanas
S/N, Granada, Spain; Oscar Saenz,
958-275282

Motoclub Castellon R.C., Rafalafena,
S/N, 12004 Castellon, Spain; Octavio
Traver, (34) 64 229705, (34) 64
237411

Outlaw-Ultima II, Puerto Rico 27,
Madrid, Spain 28016; Juan Vacas, (34)
915197298

ROARCR, Naval Station, Rota, Spain
(P.O. Box 53, FPO NY, NY 09540-
0013), PO Kelly Sexton, 011-34-56-
822652

CRAEM, La Elipa, Madrid, Spain; Pablo
Llorente, 91-3865952

SWEDEN

Amalie Racetrack, Hjort Vagen 14, 5-
46632 Sollenbrunn, Sweden; Tage
Johansson

PROCAR Speedway, Industrigatan 8,
430 20 Veddigge, Sweden; Lars Nordin,
46-0-340-38784; fax 46-0-340-38694

Sollenbrunn Miniracing Club,
Hjortvagen 14, S-446 32 Sollenbrunn;
Tage Johansson, 46-322-40944

SWITZERLAND

E.M.B.C.M. Raceway, Main
Street, opposite police station, 8854
Siebren, Switzerland; Markus Schmid,
01-9233621

ERMC Raceway, 14 Ch de Tavernay,
1218 Grand-Saconnex, Switzerland;
M. Maurer, 19-41-22-798-9765

JMRCV-Terrain du Levant, Chemin ou
Levant, 1290 Versoix, Geneva,
Switzerland; fax, 19 41 22 7790805

THAILAND

Bangkok R/C Spa Huamark, 164/1
Lardprao Soi 96, Wangthonglang
Bangkapi, Bangkok, Thailand 10310;
Mr. S. Sanghavasai, (662) 931-8390,
fax (662) 587-1188

Radio Control Speedway, 16 Soi
Suea-Yai-Uthit, Rajadaplek Rd.,
Chatujak, Bangkok 10900; Mr.
Noppakao and Mr. Suteerapong S.,
(66-2) 541-6398 or fax (66-2) 541-
6399

TURKEY

Mosi-Oa-Tunya, H9619 Highland
Harare, Harare Country, Masioraland,
Zimbabwe; 46237

B&B OTO Güven Raceway,
Gaziosmanpasa Sokak Kadiöky,
Goztepe Parki, Istanbul, 0216-
4186118, or 0216-3490742

VENEZUELA

R/C Mariche, KM4 Zona Industrial, Del
Este Via Mariche, Caracas, DF 1070-A;
Bruno Morganti, 58-02-241-3969 or
241-4993

Santa Paula R/C Club, Polideportivo
de Santa Paula urbanization Santa
Paula El Cafetal, Caracas, P.O. Box
66886 Plaza las Americas; Isaac
Abecasis 02-2423954 or Franco
Agrusa 02-4510314

WEST INDIES

Island Raceway, 8 Mile Post Jacks Hill,
St. Andrew, Jamaica, West Indies; Rodney
Littau, (809) 926-7034 or 927-1198

ZIMBABWE

Mosi-Oa-Tunya, H9619 Highland
Harare, Harare Country, Masioraland,
Zimbabwe; 46237

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Chris's

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This is my page—mine!

The opinions expressed on this page do not necessarily represent the opinions of the entire *Car Action* staff. Any resemblance to reality is purely coincidental. Send your correspondence, hate mail, love letters, photographs—anything you like—to Chris's Back Lot, c/o RCCA, 251 Danbury Rd., Wilton, CT 06897. My internet address is: chris@airage.com



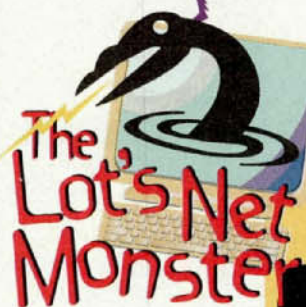
Maggot-Man Molts

To lead the spring locust swarms to the sea (much like an airborne Pied Piper), the Japanese government had world-famous Japanese modeler Dr. Yokohama-san design and build this 800-percent exact-scale model of a Dragonfly, based on a Hirobo Shuttle helicopter frame. During initial testing, unbeknownst to Dr. Yokohama, our much-loved editor John "Sluggie-boy" Howell just happened to be vacationing in northern Japan. Though John was still in the worm-like pupa stage of his miserable existence, it is now quite evident he



was late-term. Molting was just around the corner. The time of year, the unearthly whirring of Dr. Yokohama's mechanical Dragonfly and the mating buzz of one hundred trillion Japanese locusts (an unlikely set of circumstances, to be sure) were all that was needed

to throw Sluggie-boy into a premature molting convulsion. This metamorphic fit threw Sluggie's frail little bug body physiology into acute hormonal shock. Immediately after the transformation, Sluggie, now known as Buggie, flew hundreds of miles at mach speed from Sapporo (where he had hoped to do some skiing on the beginner slopes) to Dr. Yokohama's test site in Osaka. With the accuracy of a Tomahawk missile, Buggie attacked the mechanical Dragonfly in a mating frenzy and in a high-speed tumble, both fell back to earth landing in a rice paddy miles to the south. With the intense heat caused by the cataclysm, farmer Naguro's rice paddy began to boil. Reports say it continues to simmer, and farmer Naguro is suing everyone in sight for cooking his not yet mature gourmet rice. Witnesses report John Howell's last words were, "Finally!—someone who understands me!"



The "Back Lot" feud between Frank and me (see April '96) about going to 5-minute heats provoked such an overwhelming response that I figured I'd share some of it with you and invite further comment.

Here's an e-mail from a very astute, clear-thinking young man with incredible insight.

Chris, you're right. Frank, you're an idiot. Races are way too short. The length of the races has driven many people away from R/C cars. How often do you hear someone who has just been taken out by the rookie back marker say, "That's OK. I can make up time with some really fast laps." In sprint races, there's no time to make up for mistakes or wait for a good opportunity to pass. More often than not, it's hacking or brake checking, or whatever it takes to pass as quickly as possible; no time to be nice. Five-minute races might help to tone down this attitude and bring sportsmanship back to the races.

On the other hand, novices could run 4-minute races with their sport packs until they're ready to step up to the higher classes. But a well-maintained sport pack will do 5 minutes with a stock motor—probably six. Well, there's my two cents.

JMAurer402@aol.com

Here's a lame counter-argument from a squash-brain who agrees with Frank.

Frank, I completely agree with your point about the 5-minute races. I've been racing for about five years now, using a variety of batteries, motors, gear ratios and transmissions. As you know, each one of these plays an important role in run time. For about four years, I've used three Trinity Maxzilla battery packs and, to this day, with the correct gearing, they still run a good 4 minutes and 30 seconds. If the Mains and Qualifiers lasted 5 minutes, I would have to give myself at least another 45 seconds of run time by changing my gears around. I wouldn't be able to keep up with everyone and would have to spend \$100 on batteries; and, in the long run, my tires would wear more quickly.

Tell Chris I say that he's an idiot for wanting us to be like everyone else; after all, being different never stopped us Americans before!

Jonathan Blyer
RC10BTWO@aol.com

